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ANTARCTIC BIBLIOGRAPHY

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Introduction

This volume is the twentieth in a continuing series of compilations presenting abstracts and indexes of current Antarctic literature published since 1962. A companion volume to the series, *Antarctic Bibliography; 1951–1961,* extends the coverage retrospectively.

The material has been compiled over a period of 12 months; the cut-off date for inclusion in this volume was December 1992. To provide current awareness, the abstracts have also been distributed as 12 monthly bulletins under the title *Current Antarctic Literature.* The bulletins are generated from a computerized database which is also used in producing this cumulated listing and the indexes.

The present volume contains abstracts numbered from 45,063 to 47,376; these first appeared in issues no. 233 through 244 of *Current Antarctic Literature.* The first five volumes each contained 2,000 abstracts. Thus, items 1–2,000 appeared in volume 1 (published in 1965), items 2,001–4,000 in volume 2 (1966), items 4,001–6,000 in volume 3 (1968), items 6,001–8,000 in volume 4 (1970), and items 8,001–10,000 in volume 5 (1971). Volume 6 (1973) contained items 10,001–12,244, volume 7 (1974) items 12,245–14,447, volume 8 (1976) items 14,448–16,899, volume 9 (1977) items 16,900–19,248, volume 10 (1979) items 19,249–21,721, volume 11 (1980) items 21,722–24,083, volume 12 (1982) items 24,084–26,452, volume 13 (1983) items 24,453–28,961, volume 14 (1985) items 28,962–31,756, volume 15 (1986) items 31,757–34,660, volume 16 (1988) items 34,661–37,522, volume 17 (1989) items 37,523–40,798, volume 18 (1990) items 40,799–42,875, and volume 19 (1991) items 42,876–45,062.

The material is arranged in sections representing thirteen subject categories (see table of contents). Items that apply to two or more categories are listed in one section only and cross-referenced at the end of the other pertinent sections. Because of this scheme of arrangement, some items dealing with the same subject (from different aspects) will be found in two different categories; e.g. some papers on marine sediments may be found in Section E (Geological Sciences), and others in J (Oceanography). Within each section, abstracts are arranged by accession number; the indexes are keyed to these numbers.

Foreign–language titles are given in English translation first, with the original title following in brackets. Transliteration of Cyrillic and romanization of oriental languages follow the Library of Congress systems. Some of the citations are followed by library call numbers, preceded by the library symbols commonly used in union catalogs.

As a rule, the abstracts are informative rather than descriptive, but no attempt is made to verify or critically evaluate the author's statements or conclusions. Author abstracts are either used unchanged or modified for the sake of brevity or conformity to guidelines adopted for this bibliography.

Four indexes are provided: (1) an author index that includes coauthors (anonymous journal articles are referred to under the journal name); (2) a subject index that occasionally extends to two levels of subheadings and contains cross-references; (3) a geographic index to names of places, stations, and geographic features as approved by the U.S. Board on Geographic Names; and (4) a grantee index to names of organizations or institutions that received financial support from the National Science Foundation for work that resulted in publications abstracted in the volume. In each index, entries are cited by a letter, indicating the subject category, followed by the accession number: for example, B–42469 refers to section B, Biological Sciences, item number 42469.

Although the majority of the publications abstracted are in the collections of the Library of Congress, many significant items were lent by or exchanged with other institutions, made available by the Office of Polar Programs of the National Science Foundation, or received as review copies or reprints directly from publishers and authors. Because they contribute to more current and complete coverage, review copies and reprints are especially valuable, and publishers and authors are encouraged to send them to the Library of Congress, Science and Technology Division, Cold Regions Bibliography Project, Washington, D.C. 20540, U.S.A.

Requests for photoreproductions of documents cited in this bibliography, except material protected by copyright, should be directed to the Library of Congress, Photoduplication Service, Dept. C–177, 10 First Street SE, Washington, D.C. 20540. U.S. government or government-sponsored technical reports may, in most cases, be obtained from the National Technical Information Service, Springfield, VA 22151. For such reports, NTIS order numbers are usually included in the bibliographic citation.

Stuart G. Hibben, *Head*
Cold Regions Bibliograpby Project
Science and Technology Division
Library of Congress

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A. GENERAL

A-45069

Lange, G., **Where Africa and Antarctica once broke asunder,** *German Research Service. Special science reports,* 1991 7(10), p.3-5.

Encouraged by the prospect of finding new reserves of raw materials and, even more importantly, of shedding light on the still unexplained processes which occurred when the former super continent *Gondwana* broke apart, the member states of the Antarctic Treaty are embarking on a program of large-scale, geo-scientific research in the antarctic region and ocean. Manned largely by German scientists, a deep-sea drilling research program has now revealed new insights into the geological development of the Antarctic Continental Shelf and the region's climatic history.

A-45084

ANARE Club, **Aurora, Sep. 1991, Vol.11, No.1,** Melbourne, 1991, 36p.

This issue contains an article arguing in favor of the retention of huskies at Mawson Station; highlights of the 1990 spring excursion from Mawson Station to Kloa Point; a paper on the mapping of Prince Charles Mountains, an account begun in previous issues; an article on the supply and storage of food on Macquarie I.; photographs of, and comments on, the present state of Wilkes Station; and also correspondence, book reviews and miscellaneous news.

A-45088

Harris, C.M., **Environmental management on King George Island, South Shetland Islands, Antarctica,** *Polar record,* Oct. 1991 27(163), p.313-324, 50 refs. For the item referred to in the abstract, see 19A-44417.

This paper proposes management responses to problems perceived in an earlier paper on King George I. *(Polar Record* 27(162): 193-204, 1991). Available management instruments and barriers to solutions are reviewed, and new management approaches and tools postulated. The category of Antarctic Protected Area (APA) is proposed for areas needing special protection, with sub-designations of Natural, Scientific and Historic Reserves. Multiple-use Planning Areas (MPAs) are endorsed for areas of high use needing local and regional planning, including station environs, but with sub-designations Environmentally Sensitive Areas, Scientific Research Sites and Facilities Areas. Both APAs and MPAs will require management plans: APAs will be accessible only by entry permit. Also recommended are a scientific and logistic register, scheduled meetings among station commanders, development of an internationally coordinated regional scientific strategy, and an environmental information system. To manage tourism a commercial tourism licence system and tourist levy are recommended, with the industry controlled under management plans developed for APAs and MPAs, plus general Treaty provisions. Workload arising from these revisions would necessitate the Committee on Environmental Protection in the forthcoming Protocol on Environmental Protection to the Antarctic Treaty, with a permanent Treaty secretariat. This framework, requiring a multinational approach to management more sophisticated than has so far been achieved under the Antarctic Treaty, would improve and coordinate management throughout Antarctica. (Auth.)

A-45100

Académie des sciences, Paris. Comité national français des recherches antarctiques, **Report No.33 to SCAR. Scientific activities from Apr. 1 to Mar. 1991 and projected activities (Apr. 1, 1991 to Mar. 31, 1992)** [Rapport No.33 au Comité scientifique pour la recherche antarctique. (S.C.A.R.) Activités scientifiques du ler avril 1990 au 31 mars 1991 et prévues (ler avril 1991 au 31 mars 1992)], Paris, 1991, 77p., In French. Bibliography p.49-62.

The report provides the following information: the geographic and geomagnetic position of the Dumont d'Urville Station on Antarctica and those of the other 4 French stations on the subantarctic islands; a list of permanent observatories and brief descriptions and contact persons for programs conducted at the observatories and on the stations from Apr. 1990 to Mar. 1991, in atmospheric and earth sciences, biology, oceanography, and engineering; and outlines of studies projected from Apr. 1991 to Mar. 1992 in the above fields. A list of names and addresses of participating scientists concludes the report.

A-45101

Chinese Committee on Antarctic Research, **Chinese antarctic research report to SCAR. Record of activities: April 1, 1989-March 31, 1990. Planned activities: 1990-1991,** Beijing, 1990, 11p.

Outlines are presented of programs carried out at the two Chinese antarctic stations, Great Wall and Zhongshan, Apr. 1, 1989-Mar. 31, 1990, in atmospheric and earth sciences, meteorology, glaciology, geology, cartography, biology, and oceanography. Projected activities for 1990-1991 include scientific research in the above fields and construction around the two stations.

A-45102

Korea. Antarctic Research Program, **Antarctic activities of the Republic of Korea for 1990-1991. Exchange of information under Article VII(5) of the Antarctic Treaty,** [Seoul, KARP, 1990], 19p.

As exchanged information on antarctic activities for 1990-1991 summer and winter seasons, the items covered include: Ships' description, itinerary and operations; King Sejong Station's research facilities and research program and equipment; list of participating scientists; scientific projects in various disciplines and at different locations; and telecommunications equipment and schedules.

A-45110

Ushakov, A.I., **Workshop and seminar of the section on glaciology, Fall 1989** [Rabochee soveshchanie i shkola-seminar sektsii gliatsiologii osen'iu 1989 g.], *Akademiia nauk SSSR. Institut geografii. Materialy gliatsiologicheskikh issledovaniĭ,* May 1990 No.69, p.209-218, In Russian.

The first half of the Nov. 19 session was devoted to studies in the Antarctic. This report cites the scientists' names and the topics discussed at the session. These topics include the establishment of a new expert committee and its projects, analysis of the work by Soviet glaciologists in Antarctica, study of the interaction between glaciation and the ocean, Lambert Glacier, borehole drilling at Vostok Station, and the development of oases. In order to stimulate new basic research in the region, the general academic program "Antarctica" has already financed several projects.

A-45112

Louro, A., ed, Van Zele, M.A., ed, Velasco, I., ed, **First Latin American Conference on Antarctic Geophysics, Geodesy and Space Research, Buenos Aires, July 30-Aug. 3, 1990. Proceedings** [Actas de la Primera Conferencia Latinoamericano sobre Geofísica, Geodesia e Investigación Espacial Antárticas, Buenos Aires, 30 de julio al 3 de agosto de 1990], [Buenos Aires, Centro Latinoamericano de Física, 1990], 350p., In Spanish. Refs. passim. For individual papers see 19A-44909, A-45129, C-45118, C-45124, C-45145, E-45113 through E-45115, E-45117, F-45122, H-45130, I-45125 through I-45128, I-45131, I-45134, I-45146, J-45121, K-45132, K-45133, K-45135 through K-45142, K-45144, L-45116, L-45119, L-45120, L-45123, L-45143 or 46-1386 through 46-1391.

This is a collection of papers presented at the 1st Latin American Conference on Antarctic Geophysics, Geodesy and Space Research, reporting results of studies conducted in Antarctica by Latin American scientists and guests from other nations. The sponsors of the Conference include the American Geophysical Union. The papers are representative of the wide variety of interests related to the principal subject of the Conference, such as paleoclimatology, geography, geology, oceanography, satellite information, global climatic changes, sea ice, and atmospheric pollution.

A-45129

Ricciardi, H.J., **International Geosphere-Biosphere Programme (IGBP): use of space systems, antarctic research, and developing countries** [El Programa Internacional Geosfera-Biosfera (International Geosphere-Biosphere Programme, IGBP). Empleo de los sistemas espaciales. La investigación antártica. Los países en desarrollo y el IGBP], Actas de la Primera Conferencia Latinoamericana sobre Geofísica, Geodesia e Investigación Espacial Antárticas. (First Latin American Conference on Antarctic Geophysics, Geodesy and Space Research, Buenos Aires, July 30-Aug. 3, 1990. Proceedings.) Edited by A. Louro, M.A. Van Zele, and I. Velasco, [Buenos Aires, Centro Latinoamericano de Física, 1990], p.179-189, In Spanish. 18 refs.

The discussion centers on the International Geosphere-Biosphere Programme (IGBP) and its principal objective: to describe and to understand the interacting physical, chemical and biological processes regulating the Earth System as a whole, the changes in the system and how they are influenced by human activity, the antarctic research within the IGBP and the participation of the developing countries. Also discussed are the organizational structure of the IGBP, its coordinating branches and its space systems.

A-45181

Ejiri, M., Meshida, S., **Activities of the wintering party of the 30th Japanese Antarctic Research Expedition, 1989-1990,** *Antarctic record,* July 1991 35(2), p.161-226, In Japanese with English summary. 3 refs.

The wintering party at Showa Station carried out routine and fundamental observations comprising aurora, geomagnetism, ionosphere, meteorology, oceanography and seismology. The multipurpose satellite data receiving system was constructed. The telemetry data of EXOS-D (aurora observation satellite) and MOS-1 (Marine Observation Satellite) have been received. This system was also successfully used for radio astronomy as a VLBI (Very Long Baseline Interferometer) to determine precise baselines among Showa Station in Antarctica, Kashima in Japan, and Tidbinbilla in Australia. The Polar Patrol Balloon was launched and it made a seven-eighths circumpolar orbit at a stratospheric level. A meteorological PPI radar was newly operated for continuous observations. Unmanned and upper-air observations were carried out at Mizuho Station. Natural earthquakes were detected with several seismic sensors including STS sensors around Showa Station. Studies were made on human physiology and environmental sciences. The wintering party at Asuka Station carried out studies on the upper atmosphere physics, surface and upper-air meteorology, ice sheet dynamics, strain to the building on the ice plateau, and human physiology. (Auth. mod.)

A-45217

New Zealand Antarctic Society, **Antarctic, Vol.12, No.4,** Christchurch, 1991, p.93-128.

Research activities carried out by New Zealand, Australia, Pakistan, the United States and West Germany are outlined. These include the following: winter activities at Scott Base, such as testing air for pollutants; oil spill clean-up at Casey Station; the installation of a summer station, named Jinnah after the founder of Pakistan, Muhamad Ali Jinnah, in Queen Maud Land; eight cruises and programs at Palmer Station; dinosaur fossilized bones found in the Beardmore Glacier; and the sixth German Antarctic Expedition to the Ross Sea area. News items cover plans being made for a party of six people to spend 12 months at Heard I.; highlights of the 11th Antarctic Treaty Special Consultative Meeting; the resupplying of the World Park Base; the development of an environmental database for Antarctica in Cambridge, U.K.; and the climbing of Vinson Massif by two New Zealand climbers.

A-45238

Sovetskaia antarkticheskaia ekspeditsiia, Dubovtsev, V.F., ed, **Thirty-first Soviet Antarctic Expedition. Winter studies of 1985-1987** [Tridtsat' pervaia Sovetskaia antarkticheskaia ekspeditsiia. Zimovochnye issledovaniia 1985-1987 gg.], *Sovetskaia antarkticheskaia ekspeditsiia. Trudy,* 1990 Vol.89, 124p., In Russian. Refs. passim. For individual see F-45240, F-45243, F-45247 through F-45250, I-45239, I-45241, I-45242, I-45244, I-45246 and J-45245, or 46-1559 through 46-1565.

This volume contains information on observations and results of scientific efforts carried out by the 31st Soviet Antarctic Expedition in the winters of 1985-1987 on the antarctic continent and surrounding waters. Seasonal activities and organization of the expedition, including logistic support and contact with non-Soviet expeditions, are outlined in the first part of the book. The second part consists of 12 individual papers giving the scientific results of projects in meteorology, synoptics, geophysics, oceanology and climatology.

A-45303

Harrison, A.A., Clearwater, Y.A., McKay, C.P., **Conclusion: recommendations for future research,** From Antarctica to outer space: life in isolation and confinement, edited by A.A. Harrison, Y.A. Clearwater and C.P. McKay, New York, Springer-Verlag, [1990], p.395-401, 11 refs.

DLC Q180.55.P75F76

In the concluding chapter of this volume, a set of recommendations for agencies that sponsor groups in antarctic, spaceflight, and underseas environments, and for researchers who are interested in studying such groups, is outlined. The set consists of 10 recommendations for agencies and 8 for researchers.

A-45305
Ruban, I., **Ice. People. Encounters** [L'dy. Liudi. Vstrechi], Leningrad, Gidrometeoizdat, 1985, 192p., In Russian.

Presented is an account, with illustrations, of the experiences and impressions of an artist and journalist who lived and worked in the arctic and antarctic regions during 40 years.

A-45306
Krutskikh, B.A., Nikiforov, E.G., Baskakov, G.A., Mustafin, N.V., **70 years of the Arctic and Antarctic Research Institute** [70 let Ordena Lenina Arkticheskomu i antarkticheskomu institut], *Problemy arktiki i antarktiki,* 1991 Vol.66, p.7-31, In Russian with English summary.

This paper highlights the main stages of the institute's research activity in the area of physical geography and meteorology of the Arctic and Antarctica, oceanology and sea ice studies of the Arctic and southern oceans, river hydrology in the Siberian Arctic, geophysics of high latitudes (magnetosphere, ionosphere, radiowave propagation), sea/air interaction, ice and ocean physics, ice impact on a ship's hull, development and improvement of technical means to collect field hydrometeorological data in polar areas, polar medicine and human adaptation to life and work in extreme natural conditions, as well as other topics. The system that scientific hydrometeorological and geophysical information services use to meet the requirements of different branches of the economy in the Arctic, in particular, the navigation of ships along the Northern Sea Route and also to provide for the interests of the USSR in Antarctica, is described. Main directions of the research studies of the institute for the near future are indicated. (Auth. mod.)

A-45379
ANARE Club, **Aurora, Dec. 1991, Vol.11, No.2,** Melbourne, 1991, 28p.

This issue contains an article describing the 1991-1992 ANARE program; a summary of activities during the 1990s designed to enhance Australia's influence in international antarctic forums; an article on Australia's antarctic building program concerning the new designs to meet changing demands; personal recollections of the first ascent of Mount Menzies, 30 years ago, by one of the participants; activities involved in the mapping of the Larsemann Hills; and correspondence and miscellaneous news.

A-45380
Centro Ricerca e Documentazione Polare, Rome, **Polar news/Notizie polari, Vol.6, No.7-8,** 1991, p.38-44, In Italian.

The following news concerning Antarctica is included in this issue: a Pakistani expedition to Antarctica and its installation of a summer base in Queen Maud Land; tips of interest to tourists in the Falkland Is.; activities on the RV *Aranda,* conducting marine biological research in the southwest Atlantic and the eastern Weddell Sea in 1989-1990 (details of the activities are reported in English by I. Vuorinen from the University of Jyvaskyla); and a list of scientific publications.

A-45381
Centro Ricerca e Documentazione Polare, Rome, **Polar news/Notizie polari, Vol.6, No.6,** 1991, p.32-37, In Italian.

The following news concerning Antarctica is included in this issue: highlights of the 11th Antarctic Treaty meeting held in Viña del Mar, Chile, Dec. 6, 1990; the end of *Marion Dufresne* expeditions to the subantarctic islands; an analysis of the Emperor Penguin vocalization, showing structural characteristics that vary from one individual to another; and increasing tourism in Antarctica due to improved communication facilities which diminish the hazards of isolation.

A-45382
Centro Ricerca e Documentazione Polare, Rome, **Polar news/Notizie polari, Vol.6, No.9,** 1991, p.45-50, In Italian.

The following items concerning Antarctica are covered in this issue: the difficulties in counting Emperor Penguins assembled in large numbers; environmental protection measures on Amsterdam I. dealing with the proliferation of man-introduced bovines; the argument that the ozone hole was not discovered in 1985, as generally believed, but in 1958, as recorded by French scientists in Adélie Coast; and an antarctic cruise of the Italian ship m/s *Danae,* scheduled to sail in Jan. 1992.

A-45384
U.S. National Science Foundation, **United States antarctic activities, Part A: Modifications of plans for 1990-91; Part B: Plans for activities for 1991-92,** Washington, D.C, 1991, 145p.

Part A of this document includes changes to the information in Part B of the 1990 report. Part B includes the research projects and various elements of support that will be involved in the austral summer and winter activities of 1991-1992. A complete list of personnel in the U.S. Antarctic Program (USAP) is included as Appendix 1. The individual research projects of 1991-1992, grouped by discipline, are described in Appendix 2. The organization and content of this report is provided as information exchange under Articles III(1) and VII(5) of the Antarctic Treaty. The format is that prescribed in the Annex to Treaty Recommendation VIII-6, as amended by Recommendation XIII-3. While the principal activity reported herein is the national Antarctic Program (USAP) under management of the National Science Foundation (NSF), other activities (e.g.: tourism) sponsored by private U.S. groups or individuals are included. Visits to U.S. antarctic stations by non-governmental groups are included in Section XVI.

A-45450
Crawford, N., **Photographing in Antarctica: the southern lights portfolio,** *Viewcamera,* May-June 1991 4(3), p.11-17.

A participant in the Artists and Writers Program, selected by the National Science Foundation in 1988, the author describes his experiences in taking photographs in Antarctica. The selection and preparation of equipment, and management of problems such as low temperatures, condensation and working conditions, are discussed.

A-45452
Llano, G.A., **I. Mackenzie Lamb, D.Sc. (Elke Mackenzie) (1911-1990),** *Bryologist,* Fall 1991 94(3), p.315-320, Includes a list of I.M. Lamb's scientific publications.

The noted British-American lichenologist I. Mackenzie Lamb produced many scientific publications of lasting value, including outstanding studies of the genus Stereocaulon and of various groups in the antarctic region. Yet, in many ways his life was marred with tragedy. This short biography of Lamb, based on personal recollections of some of his friends and colleagues and the correspondence they maintained, includes a complete list of the 43 papers he published over a 43-year period (1936-1978). (Auth.)

A-45457
Scientific Committee on Antarctic Research, **SCAR bulletin No.101, Apr. 1991,** *Polar record,* Apr. 1991 27(161), Meeting of SCAR, 21st, July 1990, São Paulo, Brazil, p.173-191.

The agenda of the 21st Meeting of SCAR included: identification of participating individuals and organizations; reports on the administrative structure of SCAR and meetings of some of its subsidiary components; résumé of the planning for a conference on Antarctic

Science—Global Concerns, scheduled for Sep. 1991; an outline of SCAR strategy to ensure the pre-eminence of science in the antarctic domain; an explication of the SCAR position on each of the 22 recommendations of the Antarctic Treaty Consultative Meeting XV; summary reports to XXI SCAR of the Finance Committee and SCAR Working Groups on Atmospheric Sciences; Biology; Geology; Solid-Earth Geophysics; Joint Meeting of the Geology and Solid Earth Geophysics Working Groups; Human Biology and Medicine; Ad hoc Group on Antarctic Space-Related Human Factors Research; and Glaciology.

A-45458
Scientific Committee on Antarctic Research, **SCAR bulletin No.102, July 1991,** *Polar record,* July 1991 27(162), p.273-283.

This issue contains reports made to SCAR by several specialists groups when they met in São Paulo, Brazil in July 1990. In these reports, the progress and current state of research, program details, funding, research directions, and recommendations are provided. Groups represented at these meetings include Environmental Affairs and Conservation; BIOMASS Executive; Seals; Southern Ocean Ecology; Antarctic Sea Ice; Antarctic Climate Research; Evolution of the Cenozoic Palaeoenvironments of the Southern High Latitudes (GOSC); and Structure and Evolution of the Antarctic Lithosphere.

A-45459
Scientific Committee on Antarctic Research, **SCAR bulletin No.103, Oct. 1991,** *Polar record,* Oct. 1991 27(163), p.373-375.

A list is provided of names and geographic coordinates of stations of SCAR nations operating in the Antarctic during the winter 1991. Accompanying the list is a two page line drawing sketch map of Antarctica showing these stations in relation to each other. Insets show the oceanic stations north of 60S and on heavily populated King George I.

A-45460
Palca, J., **Poles apart, science thrives on thin ice,** *Science,* Jan. 17, 1992 255(5042), p.276-278.

The author comments on the state of research in both polar regions and concludes that, though somewhat reduced by decreasing funding, research is still vigorous. Besides the money crunch, three other factors tend to introduce difficulties into cold regions research programs: the dissolution of the Soviet Union; the closing/drawdown of military facilities in arctic and antarctic regions; and the increased influence of the EPA with its strong emphasis on protection of the polar environments. Several examples of the importance of polar research are cited.

A-45471
Weller, G., **Antarctica,** Encyclopedia of earth system science, Vol.1. Edited by W.A. Nierenberg, San Diego, Academic Press, 1991, p.89-100, 8 refs.

Antarctica is a continent of 14 million square kilometers located in the Southern Hemisphere, surrounding the South Pole. A layer of ice up to 4 km thick lies over about 98 percent of its area. It is the coldest, highest, and driest continent on earth, surrounded by 18 sq km of pack ice each winter. In the total earth system, Antarctica's role is to act as one of the earth's "refrigerators," affecting both the global oceanic and atmospheric circulations. Its large ice sheet stores detailed records of past atmospheric chemistry and global climates, and contains enough water to raise global sea level by some 60 m. The antarctic ice sheet has affected the climate of the world and the development of terrestrial and marine biota. Present-day Antarctica provides unique conditions for investigating the effects of anthropogenic atmospheric pollutants, such as the greenhouse effect and the ozone hole. (Auth.)

A-45546
Australia. Antarctic Division, **1990-1991 Australia Antarctic Research Program. Initial summary of research activity,** Kingston, Tasmania, 1992, 207p.

Brief summaries are provided of research conducted during the 1989 winter and 1990-1991 summer by ANARE in chemistry, earth sciences, logistics, environmental studies, glaciology, history, human biology and medicine, life sciences, mapping, meteorology, oceanography, physics, political science, psychology and personnel. Each summary shows, with variations, title, principal investigator with affiliation, location of research site, project description, aim of research, field work carried out, difficulties encountered, significance of findings, planned dissemination of results, and scientific equipment used. Following the summaries are two appendices: an author index and addresses of principal investigators.

A-45547
Australia. Antarctic Division, **Antarctic Treaty exchange information: particulars for the Australian National Antarctic Research Expedition (ANARE) under Article VII(5) for 1991-1992. Modifications of activities previously reported under Article VII(5) for 1990-91,** 1991, 117p.

Seventeen items, ranging from transport to and from Antarctica, through personnel details, small arms, scientific programs and equipment, emergency assistance facilities, description of unoccupied refuges, tourist activities and waste disposal practices are included as exchange information on planned activities for 1991-1992. Eleven modifications are made for the 1990-91 plans, including expedition itinerary, personnel details, scientific programs and equipment, other expeditions leaving Australia, number of animals killed or captured, and tourist activities.

A-45553
Enzenbacher, D.J., **Tourists in Antarctica: numbers and trends,** *Polar record,* Jan. 1992 28(164), p.17-22, 12 refs.

Approximately 39,000 tourists have visited Antarctica since 1957; numbers per year are provided. A brief history of sea and airborne tourism in Antarctica reveals past and current trends. The formation of the International Association of Antarctica Tour Operators and its role in the self-regulated tourism industry in Antarctica are considered, together with the implications of recently-promulgated Antarctic Treaty Recommendation XVI-13. The number of tourists visiting Antarctica is shown to exceed the combined number of scientists and support personnel from all national antarctic programs. It is concluded that the ATS provides a suitable framework within which to develop measures to protect Antarctica from tourist activity. However, regulations developed must be based on hard data on the size and impact of the industry to be effectively implemented. (Auth.)

A-45554
Hughes, J., **Mawson's antarctic huts and tourism: a case for on-site preservation,** *Polar record,* Jan. 1992 28(164), p.37-42, 12 refs.

Several arctic and antarctic historic sites have now been extensively excavated and some, such as the Scott and Shackleton huts in the Ross Dependency of Antarctica, have been restored and opened to visitors. The huts of Mawson's Australian Antarctic Expedition 1911-1914, the sole expedition site of the historic age in Australian Antarctic Territory, have become a tourist attraction and the subject of controversy. One view favors bringing the main hut back to Australia for display in a museum, on the grounds that the hut is deteriorating and at present inaccessible to the Australian people. Repatriation would preserve the hut on site by covering it with a dome or re-cladding, replacing the timbers which have been seriously eroded, and retaining the site (but not at present the hut interior) as a tourist feature. The author argues in favor of preservation on site, retaining as much of the original fabric of the huts as possible, and proposes the formation of an informal network to exchange information among other researchers studying polar historic sites. (Auth.)

A-45556
Davis, B.W., **Focussing an antarctic research programme: the Australian experience,** *Polar record,* Jan. 1992 28(164), p.51-56, Refs. p.55-56.

This paper illustrates the manner in which increased political and community interest in Antarctica is shifting the focus of Australian antarctic research towards environmental management, creating tensions amongst bureaucrats and scientists as to program priorities and funding allocations. It argues the existence of three distinct eras, each with particular characteristics and orientation, but all reflecting political and scientific perspectives about Antarctica at the relevant time: idiosyncratic individualism in the 'heroic age' of antarctic exploration, 1890-1945; hydra-headed science programs within the Antarctic Treaty system, 1945-1959-1990; and prospective mature management of the antarctic environment in the post-CRAMRA era from 1990 onwards. (Auth.)

A-45558
Thompson, D., **Netherlands scientific research in Antarctica,** *Polar record,* Jan. 1992 28(164), p.67, 1 ref.

Netherlands programs of antarctic scientific research in cooperation with organizations from other countries are summarized. Included are activities between 1963, when expeditions were jointly made with the Belgians, and the present, with projects in cooperation with the British Antarctic Survey, the German North Victoria Land Expedition, Australia, the United States and Poland.

A-45559
Scientific Committee on Antarctic Research, **SCAR bulletin No.104, Jan. 1992,** *Polar record,* Jan. 1992 28(164), p.81-92.

This bulletin consists of two parts, the first presenting highlights of the meeting of SCAR Executive Committee, held in Zurich, Switzerland June 6-9, 1991, and including the following: information on a meeting of the Planning Group for the Science Conference held June 5, 1991, at Bremerhaven; the International Geosphere-Biosphere Programme; antarctic scientific data; Groups of Specialists and Working Groups reports; future SCAR meetings and Antarctic Treaty meetings; relationships with ICSU and other bodies; and SCAR finance, strategy and functions. The second part consists of the recommendations adopted by the 16th Antarctic Treaty Consultative Meeting, held in Bonn, Germany, Oct. 7-18, 1991, concerning information exchange and the Antarctic Protected Area System.

A-45574
Meadows, J., Harris, C.M., **Antarctica and global climatic change: a guide to recent literature,** Antarctica and global climatic change, edited by C.M. Harris and B. Stonehouse, London, Boca Raton, FL, Bellhaven Press, Lewis Publishers, 1991, p.177-191.

This guide is intended to provide a broad introduction to the recent literature on the role of Antarctica in global climatic change. The majority of references are of a technical nature, but literature suitable for the non-specialist and some popular-level material are included. The citations are classed into these categories: General; Palaeoclimate; Sediment cores, ice cores; Glaciology, ice sheets, ice shelves; Sea ice, sea level, oceanography; Atmospheric sciences, ozone depletion, carbon dioxide; Biology, ecology; and Response strategies, management.

A-45575
Australia. Antarctic Division, **1991-92 Australian Antarctic Research Program. Antarctic Treaty exchange information. Supplement A to particulars for Australian National Antarctic Research Expeditions,** Kingston, Tasmania, 1991, 293p., Refs. passim. For selected papers see B-45579 through B-45593, E-45576, E-45577, H-45578, J-45594 through J-45596 and K-45597.

Research projects are described, proposed to be conducted by ANARE during the summer of 1991-92 and winter of 1992, in archaeology, chemistry, earth sciences, logistics, environmental studies, glaciology, history, human biology, life sciences, mapping, meteorology, oceanography, physics and psychology. Included are indexes by author and by area, an ASAC Grants scheme and a list of names and addresses of principal investigators.

A-45613
U.S. National Science Foundation, **Antarctic journal of the United States, Vol.26, No.2/3,** Washington, D.C. 1991, 32p.

Responding to growing interest in Antarctica as an ideal platform for astronomy and astrophysics studies, an experimental observatory near the Amundsen-Scott South Pole Station will operate in the 1991-1992 austral summer. The experiment for detecting neutrinos is described along with related global change research on Antarctica's role in ozone depletion. *In toto,* 490 scientists and technicians will be involved in 112 projects during this antarctic field season. Covering a broad range of disciplines, these truncated titles provide a sampling of the planned program: anti-freeze protein in freezing avoidance by fishes; phytoplankton in permanently ice- covered lakes; distribution of antarctic surface UV radiation; hydrocarbons near the *Bahia Paraiso* in Arthur Harbor; organic matter in the western Ross Sea; geodetic satellite observations; structural segmentation of the Transantarctic Mountains; ice core drilling at McMurdo; trapped gases in the Vostok ice core; west antarctic glaciology; sea ice properties/processes; water-ice interaction, Weddell Sea; silica and carbon in the Ross Sea; global monitoring of climate change; springtime antarctic stratosphere measurements; magnetometer data acquisition; South Pole air showers; VHE and gamma-ray sources; and the center for astrophysical research in Antarctica. Additionally, foundation funding awards for antarctic projects, 10/1/90-3/31/91 are announced; and weather summaries for Feb.- July 1991 at McMurdo, Palmer, and South Pole Stations are provided.

A-45813
Lyons, D.J., ed, **Directory of expertise in Australia. Antarctica and the southern ocean. First edition—Tasmania,** Hobart, University of Tasmania, Institute of Antarctic and Southern Ocean Studies (IASOS), 1991, 52p.

This is a directory of organizations and individuals based in Tasmania and interested in Antarctica. Included are indexes of 127 individuals, their organizations, and their fields of work.

A-45882
Ashley, S., **High-flying probe: *Perseus* to sail into the ozone,** *Mechanical engineering,* Jan. 1992 114(1), p.62-66.

To study the antarctic ozone hole, atmospheric scientists need new lower-cost higher-altitude instrument platforms. In 1994, *Perseus,* a sailplane-like robot craft powered by an unusual closed-cycle propulsion system, will soar 15 miles into the stratosphere to collect crucial air samples. A *Perseus* prototype recently completed successful test flights. This paper describes the development and design, and elucidates the functions of this aircraft. (Auth.)

A-45935

Holmes, N., ed, **Popular summaries,** *New Zealand antarctic record,* 1991 11(2), 48p.

This edition of the New Zealand antarctic record contains short reports of the projects which made up the 1990/91 New Zealand Antarctic Research Programme (NZARP). The summaries are arranged in groups representing the following disciplines: biology, geology, ice and snow, observatory programs, physical and atmospheric sciences, and general. An author index and a guide to authors are included.

A-45985

Bessis, J.L.H., **Contribution of the Argos system for the study of the polar regions,** International Conference on the Role of the Polar Regions in Global Change, Fairbanks, June 11-15, 1990. Proceedings, Vol.1, Fairbanks, University of Alaska, Dec. 1991, p.126-132.

The Argos data collection and location system aboard the NOAA polar orbiters has been used by many scientists studying the polar regions. This paper describes the latest improvements, the first worldwide operational location system, and summarizes some applications of the Argos System developed by North American users in the polar regions. Antarctic applications include environmental research for a better understanding of microbial ecosystems; winter data acquisition on ice motion using parachute-dropped buoys; oceanographic drifters to support operational and research programs; automatic weather and geophysical stations; high-altitude balloon experiments to observe supernovas; long-duration balloon experiments to collect data on stratospheric winds; and tracking movements of fur and Weddell seals and penguins. (Auth. mod.)

A-45996

Hatherton, T., ed, **Antarctica: the Ross Sea region,** Wellington, DSIR Publishing, 1990, 287p., Suggested reading on p.283.

DLC G890.R63.A58

This book celebrates both the Ross Dependency itself, and the work of New Zealand and other expeditions that have contributed to its study, mostly since the 1950s. The 16 chapters by New Zealand writers cover everything from history and politics to climate, sea ice, biology, geology, glaciology and international relations.

A-46029

Cumpston, J.S., **Macquarie Island,** *Australia. Department of External Affairs. Antarctic Division. Publication,* 1968 No.93, 380p., Bibliography p.333-345.

DLC G845.A8

This volume consists of 21 chapters, illustrations, maps, bibliography and index. The narrative covers the period from the discovery of Macquarie I. in 1810 until it was declared a sanctuary for birds and animals in 1933. It includes the description of various antarctic expeditions, and of individuals and organizations involved in the exploitation of seals and penguins and in the exploration of the island.

A-46031

Lorius, C., **Antarctic ice: a remembrance, a passion** [Glaces de l'Antarctique: une mémoire, des passions], Paris, Odile Jacob, 1991, 301p., In French. Refs. p.293-297.

DLC G860.L97

This is a personal account of the author's experiences in Antarctica, from the first visit to Charcot Station in 1957, to exploration of Victoria Land in 1959-1960, the ice coring at Dome C in 1974-1978, and the paleoclimatic studies from Vostok ice cores conducted by French and Soviet scientists in 1984-1985. A review is presented of the human factor in Antarctica, man's impact on antarctic climate through various forms of pollution, and of the future prospects regarding antarctic resources, conservation of the environment and geopolitical considerations.

A-46052

Vaughn, N.D., **With Byrd at the bottom of the world,** Harrisburg, PA, Stackpole Books, 1990, 196p.

DLC G850 1928 .V38

As a young man, the author was able to convince Byrd to let him join the 1929 antarctic flight-to-the-pole expedition. It was the author's experience in dog handling in addition to his youthful enthusiasm which persuaded Byrd to sign him on. The book is an account, written in the style of an educated old salt spinning yarns, of one phase in the life of an inveterate adventurer and Iditerod musher. Vignettes are included telling of how he met Byrd; training in the New Hampshire snow; the Black Gang experience aboard the *Sir James Clark Ross* on the voyage south to the Bay of Whales; the dog biscuits the dogs wouldn't eat and how the expedition nearly foundered because of it; the early rift and later reconciliation with the handler in charge of the dogs; encounters with Commander Byrd; the traverse with Laurence Gould's geological party to the Queen Maud Mountains; the tale of the sled dog, Belle; the return to civilization and readjusting to urban life; and then becoming involved with the plans for a return to Antarctica with Byrd in 1934, only to decide not to make another journey south, but to find adventure elsewhere.

A-46053

El-Sayed, S.Z., ed, **BIOMASS newsletter, vol.13 no.2,** 1991, 20p.

Although this is the final issue of the BIOMASS newsletter, business as usual continued with book reviews and reports of various working group meetings and the closing conference on antarctic science. The bulk of the issue reports various aspects of the ending of the BIOMASS program and details the closing of the BIOMASS Data Centre, including the accession cutoff date and disposition of master data sets. It also gives accounts of the ceremonies at Bremerhaven in Sep. 1991 at which the official end of the program was pronounced. A history of accomplishments is provided along with a listing of milestones which BIOMASS passed during its fifteen years of operation.

A-46075

Scientific Committee on Antarctic Research, **SCAR bulletin No.105, April 1992,** *Polar record,* Apr. 1992 28(165), p.169-175.

This bulletin presents highlights of the meeting of the Council of Managers of National Antarctic Programmes (COMNAP), held in Bologna, Italy in conjunction with the Antarctic Environmental Impact Assessment (EIA) Workshop (June 17-19, 1991) and the meeting of the Standing Committee on Antarctic Logistics and Operations (SCALOP, June 20-21, 1991). Topics under discussion focused on the prevention of, and contingency plans for response to, marine pollution, environmental impact assessment, and the use of alternative energy in Antarctica. Two documents, the practical guide-lines for the implementation of environmental impact assessment procedures, as well as SCALOP's report of the meeting, are included in this bulletin.

A-46111

Bardin, V.I., **Joint Committee on Antarctic Research** [V Mezhduvedomstvennoĭ komissii po izucheniiu Antarktiki], *Akademiia nauk SSSR. Institut geografii. Materialy gliatsiologicheskikh issledovaniĭ,* Oct. 1990 Vol.70, p.206, In Russian.

This brief article is a report on the activities of the Joint Committee for April and June 1990. The Committee recommends research to be directed toward such topics as upper atmospheric physics, solar-terrestrial relationships, the ozone layer, the composition and physical-chemical characteristics of ice, the evolution of glaciation, periglacial processes, and the biosphere, including problems in ecology and human adaptation.

A-46171
Elliot, D.H., ed, **Contributions to antarctic research II,** *American Geophysical Union. Antarctic research series,* 1991 Vol.53, 112p., Refs. passim. For individual papers see 46-3538 through 46-3541 or E-46172, E-46174, E-46175 and F-46173.

This is one of a series to present the results of the U.S. Antarctic Research Program. The volume contains four papers on the pedogenic linkage between arctic and antarctic desert soils; ablation rates of ice fields near the Allan Hills; paleoenvironmental interpretation of fine-grained Permian clastics from the Beardmore Glacier region; and the west antarctic rift system.

A-46182
Scientific Committee on Antarctic Research, **SCAR report No.7, Jan. 1992,** Cambridge, Scott Polar Research Institute, 54p.

The first portion of this issue consists of the report of the meeting, GEOSEAC II, held in São Paulo, Brazil, July 9-13 1990, which contains the following: Recommendations XV-1, 3, 4, 5, 8, 9, 10, 11, 16, 17 and 21, relating to environmental matters, adopted at the 15th Antarctic Treaty Consultative Meeting in Paris, 1989; proposals for new, and amendment to existing, protected areas and their management; discussions on the environmental impact assessment and environmental monitoring, antarctic tourism, and various other relevant subjects including SCAR's role in conservation. The second portion of this issue consists of 21 Annexes, mainly covering details regarding specific proposed Specially Protected Areas and plans for their management.

A-46183
Scientific Committee on Antarctic Research, **SCAR report No.8, Jan. 1992,** Cambridge, Scott Polar Research Institute, 40p.

The first portion of this issue consists of the SCAR/SCOR Group of Specialists on Southern Ocean Ecology report of the meeting held in Trondheim, Norway, May 21-23 1990, covering the future role of the Group, the coordination between antarctic research programs, an outline draft report from the workshop on the Ecology of the Antarctic Sea-Ice Zone, and reports from sub-groups on fish and krill biology and physiology. A number of annexes and appendices in this portion present details on the subjects discussed in the above report, including a full report of the Workshop on the Ecology of the Antarctic Sea-Ice Zone, held in Trondheim May 18-21, 1990. The second portion of this issue consists of the Group of Specialists on Southern Ocean Ecology report of the meeting held in Bremerhaven, Germany, Sep. 17-18, 1991, with a review of the EASIZ Implementation Workshop and advice to SCAR on Implementation of the EASIZ Programme. Here also a number of annexes and appendices expand on the subjects dealt with in the above report, including a full report of the EASIZ Programme Implementation Workshop, held in Bremerhaven Sep. 14-16, 1990.

A-46188
Australia. Antarctic Division, **ANARE news, No.69,** Kingston, Tasmania, 1992, 31p.

The principal feature presented in this issue covers the opening of a new Antarctic Meteorological Centre at Casey Station; the Australian operational meteorology in Antarctica; the use of general circulation models to determine climate sensitivities; the Macquarie I. data on ozone depletion; and climate at Australian stations. The general news items include: Japanese whaling activity observed near Davis Station; an ANARE wintering party set up at Spit Bay, Heard I.; miscellaneous news from, or about, the Australian stations; and geographical information systems for Antarctica. Also presented are reviews of recent publications and weather summaries for Nov.-Dec. 1991, and Jan. 1992, at Mawson, Davis, Casey and Macquarie I.

A-46189
Australia. Antarctic Division, **ANARE news, No.68,** Kingston, Tasmania, 1991, 32p.

The principal feature presented in this issue covers the negotiations and the signing in Oct. 1991 in Madrid of the Protocol on Environmental Protection, its stipulations and how they affect Australia's responsibilities in Antarctica; a Greenpeace perspective on the Protocol; the 16th Antarctic Treaty Consultative Meeting, held in Bonn, Germany, Oct. 7-18 1991, and the 13 Recommendations adopted at the meeting; the Antarctic Treaty and an updated list of Treaty Parties; and the CCAMLR's conservation and management activities. Four science articles deal with upper atmospheric physics, Soviet scientists at Davis, the southern ocean's role in world climate, and oceanographers at work. Operations and general news items include the 1991-1992 Australian antarctic program and miscellaneous news from the Australian stations. Also presented are reviews of recent publications and weather summaries for Aug.-Oct. 1991 at Mawson, Davis, Casey and Macquarie I.

A-46190
Australia. Antarctic Division, **ANARE news, No.67,** Kingston, Tasmania, 1991, 32p.

The principal feature presented in this issue covers management plans for Macquarie, Heard and McDonald Islands; studies on penguin reproductive mechanisms on Macquarie I.; the mapping of subantarctic islands; fisheries investigations in the Heard I. region; and fur seal population rise on Macquarie and Heard Islands. Science articles deal with an Australian collection of antarctic microorganisms; a new program and tools for microbial ecology at Davis; a Law Dome ice core project; and a fossil find suggesting that Antarctica was temperate only 3 m.y.a. The 1991-1992 season section includes a schedule of ANARE voyages, a list of appointed field and voyage leaders, field projects, and the Antarctic Science Advisory Committee's grants scheme. Operations and general news items cover the upgrading of part of the ANARESAT satellite network to a digital system, miscellaneous news from the Australian stations, the deployment of tide gauges in the Antarctic and around subantarctic islands, exhibition of antarctic photographs and new publications. Also presented are weather summaries for May-July 1991 at Mawson, Davis, Casey and Macquarie I.

A-46395
Chocheyras, J., **Austral voyage. A set of inquiries on the voyage** [Le voyage austral. Equipe de recherche sur le voyage], Grenoble, Université des langues et lettres, 1984, 190p., In French. Refs. passim.

DLC G877.V68

This book, presented by J. Chocheyras in cooperation with various contributors, consists of 12 articles which review the history of antarctic discovery and exploration through a prism of myths and facts about the mysterious continent. Fiction and reality are interwoven in an attempt to illustrate that an austral voyage eminently duplicates a symbolic, unconscious one.

A-46399
Suter, K., **Antarctica: private property or public heritage?,** Leichhardt, Pluto Press Australia, 1989, 209p., Refs. p.181-182.

DLC JX4084.A5896

This book provides an introduction to Antarctica's law and politics, with a view to assisting and perhaps generating some public debate and to convey some of the flavor and importance of international law. It touches upon the Antarctic Treaty, the antarctic resource potential and the steps taken by the international community to explore, exploit and protect them; it reviews conventions, resolutions by the UN General Assembly, and conservation strategies; it discusses the ozone hole and the greenhouse effect; and it examines the concepts of the common, and public, heritage of humankind. Three appendixes include full texts of the Antarctic Treaty and the Convention on the Conservation of Antarctic Marine Living Resources, and an extract from the Final Act of the Conference on the Conservation of Antarctic Marine Living Resources, held in Canberra May 17-20, 1980.

A-46460

U.S. National Science Foundation, **Antarctic journal of the United States, Vol.27, No.1,** Washington, D.C., 1992, 23p.

The inauguration of the Albert P. Crary Science and Engineering Center at McMurdo Station was observed on Nov. 5, 1991 as NSF Director Walter Massey and many distinguished visitors, scientists, and support personnel marked the beginning of a new era of scientific research in Antarctica. A brief account of Dr. Crary's varied and notable career as a scientist and science administrator is provided. Also reported in this issue are the recommendations of the 16th meeting of the Antarctic Treaty Consultative Parties in Bonn, Germany. These recommendations, made shortly after the signing of the Protocol on Environmental Protection to the Antarctic Treaty in Madrid, deal almost exclusively with the strengthening of various requirements for improving environmental protection procedures in Antarctica. New sites of special scientific interest are established and management plans detail how the sites are to be protected. The issue closes with a listing of NSF antarctic funding awards for the period 10/1/91 through 12/31/91 and weather summaries for McMurdo, Palmer, and Amundsen-Scott Stations for Nov. and Dec. 1991 and Jan. 1992.

A-46568

Cook, G., ed, **Future of Antarctica: exploitation versus preservation,** Manchester, University Press, 1990, 172p., Refs. passim.

This book, based on papers presented at a conference on *Antarctica: An Exploitable Resource or Too Valuable to Develop?,* examines the debate over the future of Antarctica, which has become a political test case for international environmental cooperation. It begins with an overview of the development of the Antarctic Treaty system and the background to the present debate about the Minerals Convention. Next, the environmental and scientific importance of Antarctica is explained and what is known about its potential mineral resources. Some of the legal issues are explored; the appendices provide background documents and information. (Auth. mod.)

A-46598

Centro Ricerca e Documentazione Polare, Rome, **Polar news/Notizie polari, Vol.7, No.3,** 1992, p.17-24, In Italian.

The following items concerning Antarctica are covered in this issue: the planning of a new South African research complex intended to replace Sanae Station by 1993; Chinese activities planned in Antarctica, including 4 cruises to study the biomass in waters off the Antarctic Peninsula; the description of a giant iceberg, separated from the continental ice shelf in 1987 and floating in the Weddell Sea until it was dragged into the Antarctic Circumpolar Current; and an account, submitted in English by the National Science Foundation, of plans to begin testing an experimental observatory, which will be located near Amundsen-Scott Station, intended to contribute significantly to research in astronomy and astrophysics. The review of a book lamenting the lack of enthusiasm in Italian individuals, private organizations and government agencies for Italian research in Antarctica, concludes this issue.

A-46599

Centro Ricerca e Documentazione Polare, Rome, **Polar news/Notizie polari, Vol.7, No.2,** 1992, p.9-16, In Italian.

The following items concerning Antarctica are covered in this issue: an increase in government funding for the Australian antarctic research program in 1991-1992, surpassing by 5.4 million dollars the 68.2 millions granted in the previous season; a marine biology study conducted in Prydz Bay on board the *Aurora Australis;* the opening of a whaling museum on South Georgia; and highlights of the Netherlands antarctic research, from its beginnings in the 1960s to the present, submitted in English by the Ministry of Foreign Affairs, The Hague. A list of publications relevant to Antarctica is included.

A-46600

Centro Ricerca e Documentazione Polare, Rome, **Polar news/Notizie polari, Vol.7, No.1,** 1992, p.1-8, In Italian.

The principal subject in this issue is the concern about the effects of anthropogenic pollution on atmospheric structure and, ultimately, on the global climate. Glaciological studies, showing a connection between the ozone hole in Antarctica and the presence of nitrates in stratospheric clouds, and in ice and snow, are briefly reviewed. Some details regarding an international expedition, which left Oslo in Oct. 1991 on a 3-year project to gather meteorological and glaciological data on the Filchner Ice Shelf, are given. This includes the hunt for a tent supposedly left by Amundsen at the South Pole, when he reached it for the first time in Dec. 1911. A separate item of interest relevant to Antarctica concerns the launching of a joint American-Soviet research station on an ice floe, in Feb. 1992, that will drift more than 5 months and 400 miles through the Weddell Sea. A detailed account of this project is given in English.

A-46601

Centro Ricerca e Documentazione Polare, Rome, **Polar news/Notizie polari, Vol.6, No.12,** 1991, p.68-75, In Italian.

The following items concerning Antarctica are covered in this issue: the flight to South Pole by a 7-woman crew of the Navy Development Squadron Six (VXE6), the first of 3 flights scheduled to officially open the 1991-1992 season; the new international antarctic center at Christchurch; a new National Science Foundation research laboratory, opened at McMurdo Station on Nov. 5, 1991, expected to greatly facilitate research on global climatic changes; a review of the main BIOMASS-related British activities during the 1990-1991 summer, a pelagic ecosystem studies cruise on RRS *John Biscoe* and a fish stock assessment cruise on MV *Falkland Protector;* the new air route Moscow-Molodezhnaya, with a stop-over at Cape Town; a conference on polar regions, held in Rome Nov. 21-22, 1991, stressing the need for improvement in Italian antarctic research efforts; a review of a book on the German Democratic Republic expeditions to Antarctica; and a list of scientific publications.

A-46602

Centro Ricerca e Documentazione Polare, Rome, **Polar news/Notizie polari, Vol.6, No.11,** 1991, p.60-67, In Italian.

The following items concerning Antarctica are covered in this issue: the possible cause of death of a large number of skua chicks near Palmer Station (natural, or a consequence of the *Bahia Paraiso* oil spill?); a code of conduct for antarctic cruises by an international association of tourism, based on the need for environmental protection from an estimated count of 4000 tourists expected in the 1991-1992 season; highlights of a 3-year Japanese study of Adélie penguins; an account of the activities of the Australian research/resupply vessel

Aurora Australis during its first cruise in antarctic waters, Jan. 3-Mar. 19, 1991; a June 4 flight to McMurdo in a rescue operation of a gravely ill member of the Scott Base party; and the review of a new book, *Antarctica, a continent of ice,* published in Italy in 1990.

A-46603

Centro Ricerca e Documentazione Polare, Rome, **Polar news/Notizie polari, Vol.6, No.10,** 1991, p.52-59, In Italian.

The following items concerning Antarctica are covered in this issue: the discovery of fossil remains of a dinosaur on Mount Kirkpatrick, considered to be the final proof of the existence of the supercontinent Gondwana; highlights of Indian antarctic research, from its beginnings in 1981 to the present, submitted by the Embassy of India in Rome; a French polar expedition outline of projects to be carried out during the 1991-1992 season, including 5 resupply voyages to Adélie Coast by the ship *Astrolabe* and features regarding the financing of the expedition; and brief news items regarding several polar ships.

A-46629

Rocha-Campos, A.C., **Future of Brazilian antarctic research** [O futuro da pesquisa antártica brasileira: uma reflexão], Ciências atmosféricas e espaciais na Antártica. Anais do I Seminário Sobre Ciências Atmosféricas e Espaciais do Programa Antártico Brasileiro. (Atmospheric and space sciences in Antarctica. First Seminar on Atmospheric and Space Sciences of the Brazilian Antarctic Program, São José dos Campos, Apr. 27-29, 1988. Proceedings.) Edited by E.B. Pereira and V.W.J.H. Kirchhoff, Brazil, Instituto de Pesquisas Espaciais, 1989, p.245-271, In Portuguese with English summary.

The prospects for the development of the Brazilian Antarctic Program (PROANTAR) are examined in the light of the present factors and circumstances affecting scientific activities in Antarctica. Outlines of research planned in the fields of biology, terrestrial and atmospheric physics, and oceanography are presented. (Auth. mod.)

A-46630

Prates, A.G.R., **Rules for scientists in Antarctica designed to protect the environment and to guarantee the continuity of antarctic scientific projects** [Normas de conduta para cientistas na Antártica destinadas à proteção do meio-ambiente e à garantia da continuidade de projetos científicos antárticos], Ciências atmosféricas e espaciais na Antártica. Anais do I Seminário Sobre Ciências Atmosféricas e Espaciais do Programa Antártico Brasileiro. (Atmospheric and space sciences in Antarctica. First Seminar on Atmospheric and Space Sciences of the Brazilian Antarctic Program, São José dos Campos, Apr. 27-29, 1988. Proceedings.) Edited by E.B. Pereira and V.W.J.H. Kirchhoff, Brazil, Instituto de Pesquisas Espaciais, 1989, p.272-285, In Portuguese with English summary.

The antarctic environment can be threatened by expanding activities on the continent. To help prevent damage to the environment (so far, almost uncontaminated and, consequently, most apt to allow the definition of baselines) and ensure stable conditions for scientific research, the Antarctic Treaty Consultative Parties have kept the question of environmental protection under constant review, and have passed Recommendations whose content must be kept in mind by all who perform activities in Antarctica, including scientists. (Auth.)

A-46631

Berbert, C.O., **Earth sciences in the Brazilian Antarctic Program** [A área de Ciências da Terra no PROANTAR], Ciências atmosféricas e espaciais na Antártica. Anais do I Seminário Sobre Ciências Atmosféricas e Espaciais do Programa Antártico Brasileiro. (Atmospheric and space sciences in Antarctica. First Seminar on Atmospheric and Space Sciences of the Brazilian Antarctic Program, São José dos Campos, Apr. 27-29, 1988. Proceedings.) Edited by E.B. Pereira and V.W.J.H. Kirchhoff, Brazil, Instituto de Pesquisas Espaciais, 1989, p.286-311, In Portuguese with English summary. 10 refs.

The PROANTAR's Earth Sciences Subprogram has 10 projects in execution presently, which use geological, geophysical, and oceanographic surveys as chief means of studies on the antarctic continent. Seismic, magnetometric and gravimetric surveys in the Bransfield Strait and Bellingshausen Sea are carried out under the PROANTAR's Solid Earth Geophysics Subprogram. The effective utilization of remote sensing techniques is still not implemented in the PROANTAR (basically the use of LANDSAT and SPOT satellites images). A series of recommendations have been made by the SCAR Working Groups on Glaciology and Geology to induce international cooperation in the acquisition and studies of these images. (Auth. mod.)

A-46632

Gurgel, I.M.G.N., **Life Sciences Subprogram and its relationship with the remaining areas of knowledge** [O Subprograma de Ciências da Vida e suas relações com as demais áreas do conhecimento], Ciências atmosféricas e espaciais na Antártica. Anais do I Seminário Sobre Ciências Atmosféricas e Espaciais do Programa Antártico Brasileiro. (Atmospheric and space sciences in Antarctica. First Seminar on Atmospheric and Space Sciences of the Brazilian Antarctic Program, São José dos Campos, Apr. 27-29, 1988. Proceedings.) Edited by E.B. Pereira and V.W.J.H. Kirchhoff, Brazil, Instituto de Pesquisas Espaciais, 1989, p.312-317, In Portuguese with English summary.

An appeal is made to international organizations, such as UNESCO-IOC and CCAMLR, to be open to combined efforts in, among others, biological and oceanographic research in the southern ocean. Admiralty Bay, where the Brazilian Antarctic Program (PROANTAR) intends to carry out ecosystem studies, is suggested as an ideal location for such international and interdisciplinary efforts.

A-46701

Moreano, H., **Ecuador in Antarctica—Past and future** [Ecuador Antártico—Pasado y futuro], *Acta antártica ecuatoriana,* 1990 Vol.1, p.83-86, In Spanish with English summary. 1 ref.

Activities indicating Ecuador's interest in Antarctica over two decades, from its declaration in the Constitutional Assembly in 1967 to its admission as a Consultative Member of the Antarctic Treaty in 1990, are briefly reviewed. Ecuador has built an administrative and logistically operational and scientific structure to deal with antarctic matters. The necessity for strengthening such a structure is stressed, if plans of the Ecuadorian Antarctic Program (PROANTEC) are to include expanding and broadening its activities.

A-46713

Pereira, E.B., ed, Kirchhoff, V.W.J.H., ed, **INPE in Antarctica: in celebration of INPE's 30 years** [O INPE na Antártica: edição comemorativa dos 30 anos do INPE], São José dos Campos, Transtec Editorial, 1992, 108p., In Portuguese and English. Refs. p.96-107.

The Brazilian Institute for Space Research (INPE) is one of the leading scientific Institutes supporting the Brazilian Antarctic Program (PROANTAR) since 1982, and providing scientists for the Comandante Ferraz Station since its installation in the summer of 1983-1984. INPE's activities and the structural organization of PROANTAR are described; the atmospheric research projects are summarized.

A-46727
Santiago de Chile. Instituto Antártico Chileno. Comité Nacional de Investigaciones Antárticas, **Report on Chilean antarctic activities to SCAR No.30, 1988. Activities Apr. 1987-Oct. 1988; Activities Oct. 1988-Oct. 1989** [Informe de las actividades Antárticas de Chile al SCAR No.30, 1988. Actividades abril 1987-octubre 1988; Actividades octubre 1988-octubre 1989], Santiago de Chile, June 1988, 47p., In Spanish and English. Bibliography p.44-45.

The Chilean antarctic scientific research program was conducted in the 1987-1988 season from 5 permanent bases—one operating only in summer, another in recess—4 INACH scientific stations, 2 temporary refuges, and 4 research ships. In parallel Spanish and English texts, details of the programs are outlined in: meteorology, biology, geology, geodesy, ecology, terrestrial and atmospheric physics, oceanography, remote sensing, logistics, and tourism. For these programs, specific projects, task locales, and instruments are given. Planned activities for the 1988-1989 season are similarly outlined.

A-46729
Stonehouse, B., **Monitoring shipborne visitors in Antarctica: a preliminary field study,** *Polar record,* July 1992 28(166), p.213-218, 14 refs.

During every austral summer since the International Geophysical Year 1957-58, several thousand scientists and support staff have worked in Antarctica. A more recent development is the annual advent of 4,000-5,000 tourists, who now probably outnumber expedition members in the area covered by the Antarctic Treaty System. Most tourists come by ship, visiting coastal areas of the Antarctic Peninsula and the South Orkney and South Shetland Is. that are readily accessible between Nov. and Mar.: smaller numbers visit the Ross Dependency and Adélie Land sectors. This article reviews Antarctic Treaty and International Union for the Conservation of Nature and Natural Resources (IUCN) attitudes to tourism, and outlines a preliminary study of shipborne tourism between late Dec. 1991 and Mar. 1992 on Half Moon I., South Shetland Is. Within one month (Jan.) a survey team from the Scott Polar Research Institute, University of Cambridge, recorded 14 visits by six tour ships, bringing more than 2,000 tourists. In addition, attitudes and expectations of visitors were studied on five ships. Arising from this study, a program of visitor monitoring is planned as a joint project among British, Chilean, and Argentine scientific institutions during the next five years. Objectives are to find ways of minimizing both short-term and long-term impacts of tourists and other visitors on breeding birds and other ecological communities, and to provide a factual basis for regulation under the Antarctic Treaty System.

A-46731
Hattersley-Smith, G., **Shackleton Valley, South Georgia,** *Polar record,* July 1992 28(166), p.233, 4 refs.

This is one of three notes which advocate two different features on South Georgia to be designated Shackleton Valley, the valley which Shackleton descended to a whaling station following his 24-hour trek from King Haakon Bay in 1916. Shackleton's transposition of the Husvik and Stromness Whaling Stations aside, the points at issue are the location of a waterfall (there seem to be two of them) Shackleton described, the whistle sound he heard from the whaling station, and the interpretation of the meeting between Shackleton and Sorlle, the manager of the whaling station. All advocates make strong cases for their divergent views.

A-46732
Burley, M.K., **Was Shackleton Valley the passageway to Stromness,** *Polar record,* July 1992 28(166), p.234-236, 5 refs.

See abstract for A-46731.

A-46733
Gilkes, M.J., **Husvik or Stromness: a South Georgia enigma,** *Polar record,* July 1992 28(166), p.236-237, 4 refs.

See abstract for A-46731.

A-46735
Erskine, A.B., **Shackleton's landing,** *Polar record,* July 1992 28(166), p.242-244, 2 refs.

This is an account of a retracing of Shackleton's arrival in King Haakon Bay, at South Georgia, following a sixteen day, 700 mile, open boat journey from Elephant Island in May 1916. Examples are given of Shackleton's 'luck': after making a path through the brash ice of the Bay, finding a sheltered cove at the head of the Bay; finding a small fresh-water stream nearby; discovering at the end of the beach, a small cave just large enough for six people and having a supply of tussock grass for mattresses; coming upon wandering albatross chicks on their nests to provide food. The final piece of 'luck' was the recovery of the rudder from their open boat; it had been torn away during the landing and had drifted away. Three days later it drifted back.

A-46745
Hoshiai, T., Murano, M., Nasu, K., Terazaki, M., **Japanese activities for BIOMASS,** *Antarctic record,* Nov. 1991 35(3), p.402-433, Refs. p.423-433.

The Japanese Antarctic Research Expedition contributed to BIOMASS with observations onboard the *Fuji* and the *Shirase* and with shore-based research at Showa Station. In addition, the *Umitaka Maru III* and the *Hakuho Maru* investigated primary productivity, abundance and distribution of phytoplankton, zooplankton and micronekton and organic particles in waters south of Australia. The *Kaiyo Maru* surveyed physical, chemical and biological conditions in the Indian and Atlantic sectors of the southern ocean. Stress was put on the acoustic survey of krill abundance and distribution for the estimation of its biomass. Accordingly, studies of target strength were undertaken. The Japanese Antarctic Research Expedition provided physical, chemical and biological data obtained in the ice-covered waters along with those in open seas. Summer data in the fast ice edge zone and year-round data at Showa Station complemented the Japanese BIOMASS data file. (Auth. mod.)

A-46751
Naito, Y., **Activities of the wintering party at Syowa Station by the 31st Japanese Antarctic Research Expedition in 1990,** *Antarctic record,* Mar. 1992 36(1), p.65-82, In Japanese with English summary. 2 refs.

Activities of the JARE-31 wintering party at Showa Station, from Feb. 1, 1990 to Jan. 31, 1991, are described. The major tasks performed included the launching of an ozone sonde in observations of total ozone, STS earthquake observations, ACR field experiments focussing on sea-ice-air interaction, EXOS-D and MOS-1 satellite observations, and penguin foraging observations. Also reported is a new program of waste disposal designed to protect the antarctic environment, including transportation of large amounts of waste back to Japan.

A-46752
Shiraishi, K., **Activities of the 4th wintering party at Asuka Station by the 31st Japanese Antarctic Research Expedition in 1990,** *Antarctic record,* Mar. 1992 36(1), p.83-108, In Japanese with English summary. 2 refs.

Activities of the JARE-31 wintering party at Asuka Station from Dec. 25, 1989, to Dec. 26, 1990, are described. The most important of these were related to meteorological observations and studies of atmospheric physics. Additional projects included geological investigation and search for meteorites in the Sör Rondane Mountains, biomedical and glaciological studies, and a survey of the station's logistics.

A-46842
European Committee on Ocean and Polar Sciences, **Ocean and the poles: European co-operation in ocean and polar research,** Strasbourg, France, European Science Foundation, 1991, 66p., Refs. passim.

The European Committee on Ocean and Polar Science (ECOPS) was established by the European Science Foundation and the Commission of the European Communities in 1989 to promote European cooperation in ocean and polar research in the Arctic and Antarctic. Topics pertinent to the Antarctic include forecasting of ocean circulation; biological speciation and distribution in the polar oceans, and the effect of plankton on the atmosphere; interaction between sea ice, the ocean, and the atmosphere; relation between ice sheets, sea level, and climate change; and paleoclimatology studies from ice and sediment cores.

A-46897
Santiago de Chile. Instituto Antártico Chileno, **Boletín antártico chileno, Vol.11, No.1,** Apr. 1992, 40p., In Spanish.

This issue carries articles covering a review of history connecting Spain with early exploration of the Antarctic; the description, installation and operation of a detector of cosmic radiation on King George I.; the installation and function of a new satellite base (ERS VLBI) at Bernardo O'Higgins Station; the progress of a study on the ecology of the seal *Arctocephalus gazella* on Livingston I.; the inauguration at Punta Arenas of an antarctic coordination center designed to facilitate Chilean activities in Antarctica; the installation by INACH of a year-round refuge on Cape Shirreff; an outline of the form of presentation of a research project to INACH; a summary of the activities of the 28th Chilean Antarctic Expedition; the Antarctic Protocol; international antarctic news items and activities at INACH; and a chronology of regional and international scientific meetings, May through Dec., 1992.

A-46946
U.S. National Science Foundation, **Antarctic journal of the United States, Vol.27, No.2,** Washington, D.C., 1992, 23p.

The launching of United States' first commercial icebreaking research ship, *Nathaniel B. Palmer,* is reported, and a description of the ship is given. Additional information provided in this issue covers the following: a progress update of a 5-year U.S. program to improve safety, environmental protection, and health conditions at U.S. facilities, with tables highlighting some of the accomplishments during the past 3 years at sites in continental Antarctica and in the Antarctic Peninsula region; a review of the 1959 Antarctic Treaty Conference, presented by O. Pinochet de la Barra, Chilean representative at the 16th Antarctic Treaty Consultative Meeting in Bonn, Germany, in Oct. 1992; a preliminary geologic report of the Amundsen Sea-Bellingshausen Sea cruise of the *Polar Sea,* Feb. 12-Mar. 21, 1992; the restoration of East Base, Stoning I., the oldest remaining U.S. research station in the Antarctic; a list of U.S. personnel wintering at McMurdo, Palmer, and Amundsen-Scott stations in 1992; a list of National Science Foundation antarctic awards made from Jan. 1 to Mar. 31, 1992; and weather summaries for McMurdo, Palmer and Amundsen-Scott for the period Feb.through Apr., 1992.

A-46947
Capozoli, U., **Antarctica, the last land** [Antártida, a última terra], São Paulo, Editora da Universidade de São Paulo, 1991, 384p., In Portuguese. Refs. p.383-384.
DLC G860.C29

This is a narrative of the author's experiences and impressions recorded during his voyage to Antarctica in 1985 on board the Brazilian research ship *Professor Wladimir Besnard.* It is interlaced with comments about the history of antarctic discovery and exploration, and its geography, biology and climate.

A-46949
Centro Ricerca e Documentazione Polare, Rome, **Polar news/Notizie polari, Vol.7, No.4,** 1992, p.25-31, In Italian.

The following items concerning Antarctica are covered in this issue: the dimensions of the ozone hole, obtained in Oct. 1991; the collection of 600 new meteorites in the 1991-1992 season; the activities of an association, with approximately 800 members, of French polar veterans; a joint American-New Zealand crustal study carried out in the Transantarctic Mountains during the 1990-1991 summer season; a research project covering the study of seasonal variations in the antarctic marine ecosystem; the role of marine sediments in paleoclimatological studies; and the finding of gold particles on Mt. Erebus.

A-46950
Centro Ricerca e Documentazione Polare, Rome, **Polar news/Notizie polari, Vol.7, No.5,** 1992, p.32-39, In Italian.

The following items concerning Antarctica are covered in this issue: the first joint expedition to Antarctica by Finland, Sweden and Norway on the Russian ship *Akademik Fedorov,* which deposited them on their respective stations of Aboa, Wasa and Troll; highlights of the 1990-1991 research carried out by the Swedish Antarctic Expedition; the 5-year plan for waste disposal at McMurdo Station; the monitoring of penguin populations on King George I.; a brief review of the areas of volcanic eruptions and the activation of an international telemetric seismic net to control the telluric activity of the Bransfield Rift; and a Norwegian plan to incorporate tourist participation in their future antarctic expeditions.

A-46964
South Africa. Weather Bureau, **Newsletter/Nuusbrief, No.507, June 1991,** 1991, 32p., Text and titles in Afrikaans or English.

South African research activities on Marion and Gough Islands, and at Sanae Station, along with general news items are reported. An account is given of a voyage from South Africa to the South Sandwich Is. by a visitor. Presented are weather reports, including ozone measurements, with tables and graphs for the month of June, 1991. Hemispheric circulation anomalies during that month are discussed and illustrated.

A-46965
South Africa. Weather Bureau, **Newsletter/Nuusbrief, No.509, Aug. 1991,** 1991, 32p., Text and titles in Afrikaans or English.

South African research activities on Marion and Gough Islands, and at Sanae Station, along with general news items are reported. A brief description of a Soviet rescue mission to Molodezhnaya Station in June, 1991, is given. Presented are weather reports, including ozone measurements, with tables and graphs for the month of Aug., 1991.

A-46966
South Africa. Weather Bureau, **Newsletter/Nuusbrief, No.510, Sep. 1991,** 1991, 32p., Text and titles in Afrikaans or English.

South African research activities on Marion and Gough Islands, and at Sanae Station, along with general news items are reported. Presented are weather reports, including ozone measurements, with tables and graphs for the month of Sep., 1991.

A-46967
South Africa. Weather Bureau, **Newsletter/Nuusbrief, No.514, Jan. 1992,** 1992, 40p., Text and titles in Afrikaans or English.

South African research activities on Marion and Gough Islands, and at Sanae Station, along with general news items are reported. Presented are weather reports, including ozone measurements, with tables and graphs for the month of Jan., 1992. Hemispheric circulation anomalies during that month are discussed and illustrated.

A-46968
South Africa. Weather Bureau, **Newsletter/Nuusbrief, No.515, Feb. 1992,** 1992, 32p.

South African research activities on Marion and Gough Islands, and at Sanae Station, along with general news items are reported. Presented are weather reports, including ozone measurements, with tables and graphs for the month of Feb., 1992. Hemispheric circulation anomalies during that month are discussed and illustrated.

A-46969
South Africa. Weather Bureau, **Newsletter/Nuusbrief, No.516, Mar. 1992,** 1992, 35p., Text and titles in Afrikaans or English.

South African research activities on Marion and Gough Islands, and at Sanae Station, along with general news items are reported. An article describing Voyage 66 of the SA *Agulhas* to Sanae Station in the 1991-1992 season is included. Presented are weather reports, including ozone measurements, with tables and graphs for the month of Mar., 1992. Hemispheric circulation anomalies during that month are discussed and illustrated.

A-46970
South Africa. Weather Bureau, **Newsletter/Nuusbrief, No.517, Apr. 1992,** 1992, 32p., Text and titles in Afrikaans or English.

South African research activities on Marion and Gough Islands, and at Sanae Station, along with general news items are reported. Included is the continuation of an article appearing in last month's issue describing Voyage 66 of the SA *Agulhas* to Sanae Station in the 1991-1992 season. Presented are weather reports, including ozone measurements, with tables and graphs for the month of Apr., 1992. Hemispheric circulation anomalies during that month are discussed and illustrated.

A-46971
Santiago de Chile. Instituto Antártico Chileno. Comité Nacional de Investigaciones Antárticas, **Report on Chilean antarctic activities to SCAR No.31, 1989. Activities Apr. 1988-Oct. 1989; activities Oct. 1989-Oct. 1990** [Informe de las actividades Antárticas de Chile al SCAR No.31, 1989. Actividades abril 1988-octubre 1989; Actividades octubre 1989-octubre 1990], Santiago de Chile, Aug. 1989, 41p., In Spanish and English. Bibliography p.37-39.

The Chilean antarctic scientific research program was conducted in the 1988-1989 season from 5 permanent bases—one operating only in summer, another in recess—4 INACH scientific stations, 2 temporary refuges, and 3 research ships. In parallel Spanish and English texts, details of the programs are outlined in geology, terrestrial and atmospheric physics, biology, meteorology, oceanography, logistics and tourism. For these programs, the specific projects, task locales, and instruments are given. Planned activities for the 1989-1990 season are similarly outlined.

A-46972
Istituto Geografico Polare Silvio Zavatti, **Il Polo, Mar. 1992, Vol.1,** Fermo, Italy, 1992, 46p., In Italian.

Two articles in this publication are pertinent to Antarctica: one reviews the voyage of the British ship *Challenger* (Dec. 1873-Feb. 1874) along the antarctic coasts, quoting extensively from the Expedition papers published in 1876; the other describes briefly, and from a philatelic point of interest, a couple of Italian antarctic expeditions as recorded in the author's personal collections of envelopes and stamps. A brief news item refers to plans for an Italian polar research ship, giving some details about its dimensions and its living and research facilities.

A-46995
ANARE Club, **Aurora, Mar. 1992, Vol.11, No.3,** Melbourne, 1992, 32p.

This issue contains an article describing a visit to Vostok Station by an international group of scientists assigned to do some work there in the summer of 1990-1991; news from the Antarctic Division, including the itemizing of some of the 7,000 cu m of cargo carried by the *Icebird* to Davis, Mawson and Heard I.; an article describing and illustrating Australian antarctic stamps; a brief review of China's antarctic research program called the "8.5" plan; personal recollections of a radio operator working on Macquarie I. in 1952-1953, including information on communication equipment and training programs; and correspondence and miscellaneous news.

A-46996
Funiciello, R., Manzoni, M., **Italian antarctic program 1985-1990** [Programma antartico italiano 1985-1990], *Energia e materie prime,* Jan.-Feb. 1991 No.77, p.63-69, In Italian. 10 refs.

Positive and negative aspects of Italy's involvement in Antarctica are considered, counting among the former the coherence of Italian antarctic laws between the goals assigned and the mechanisms designated to carry them out, and the successful logistics and research activities. The negative aspects discussed include the financial burden, personnel problems, duplication of research projects due to publishing delays, and the bureaucracy involved in approving each program.

A-46997
Cervellati, R., ed, **Italy in Antarctica** [Italia in Antartide], Rome, Programma Nazionale di Ricerche in Antartide, [1992], 35p., In Italian.

The text and numerous photographs of this booklet deal with the antarctic continent and Italian political and scientific involvement there, together with such aspects as landscape, geography, tectonics, physics, oceanography, climate and ecology of the region. A chronology of various antarctic expeditions and important events between 1557 and 1985 is included.

A-47016
Kokubun, S., **Programs of JARE-32 in 1990-1992,** *Polar news,* Mar. 1991 No.52, p.28-34, In Japanese.

The 32nd Japanese Antarctic Research Expedition, JARE-32 for 1990-1992 is part of a continuing series of year-round observations in

Antarctica, mostly at Showa Station, but also at Asuka and Mizuho stations, and onboard the Japanese ice-going research vessel *Shirase*. Programs include studies on global change from ice cores, global environmental monitoring, upper atmospheric observations from polar patrol balloons, establishment of an International Absolute Gravity Base Station Network, glacier mass balance and flow observations, manned and unmanned marine and terrestrial weather observations, ocean bottom topography and ocean chemistry observations, marine and terrestrial biology studies, and waste treatment. A table presenting an outline of the programs and a table listing the names, disciplines, and affiliations of the 55 participants are also included.

A-47020

Italy. Consiglio Nazionale delle Ricerche. Comitato per le Scienze e le Tecnologie dell'Ambiente e dell'Habitat, **Italy's new 5-year scientific research program in Antarctica for 1992-1996** [Contributo della Commissione per il Coordinamento della Ricerca Scientifica Polare alla formulazione del nuovo programma quinquennale di ricerche in Antartide 1992-1996], Rome, 1991, 61p., In Italian. Ambiente Antartide (Special issue).

A 5-year plan, proposed by the Italian Commission for the Coordination of Polar Scientific Research and in agreement with a law passed in 1985 regulating the Italian activities in Antarctica, is presented. The components of the coordinated program of multidisciplinary investigations are as follows: crustal endogenous and exogenous processes, including paleoclimatic and paleoecologic studies; atmospheric chemistry and climatic changes; ecology of the southern ocean and air-ice-water interaction; the biological impact of ozone depletion; Earth-sun relationship and astrophysical research; antarctic biology; chemical and radiochemical methodology for environmental pollution assessments; utilization of satellite and radar imaging data in Antarctica; and geographic and anthropic studies of general interest. The structure of the program is outlined in the concluding chapter.

A-47021

Italy. Consiglio Nazionale delle Ricerche, **Ambiente Antartide, June 1, 1990, No.1,** Rome, 1990, 17p., In Italian.

The following is discussed in this issue: the structure and function of the Programma Nazionale di Ricerche in Antartide (PNRA), the Italian antarctic research program based on a 1985 law (No.284) authorizing the 1st Italian Antarctic Expedition and providing the foundation for a multiyear research plan; the operations, responsibilities and organization of the Consiglio Nazionale delle Ricerche (CNR), of which the PNRA is an integral part; the activities of the 5th Italian Antarctic Expedition, conducting multidisciplinary investigations at the Terra Nova Bay Station in the summer of 1989-1990; geophysical research conducted in Bellingshausen, Amundsen and Ross seas from the ship *OGS—Explora* during the summer seasons between 1987 and 1990; joint activities with scientists at Amundsen-Scott and Dumont d'Urville stations; some details of an oceanographic research project called Cariboo; and brief reports of studies on antarctic fish acclimatization and sea water pollution. The program of the 2nd International Conference on the Biology of Antarctic Fish, and a schedule of future meetings relevant to Antarctica, conclude this issue.

A-47022

Italy. Consiglio Nazionale delle Ricerche, **Ambiente Antartide, May 4, 1992, No.4,** Rome, 1992, 36p., In Italian.

This issue begins with the following items of interest: the full text of a new Italian antarctic law (No.380), signed on Nov. 27, 1991, specifying the procedures required to organize and carry out antarctic scientific expeditions; an outline of the Italian National Antarctic Research Program (PNRA) in the light of the new Law No.380; and highlights of the 16th Antarctic Treaty Consultative Meeting held in Bonn Oct.7-18, 1991. In the research section, the following items relevant to Antarctica are discussed: the acclimatization physiology of antarctic fishes; the risk of increased ultraviolet radiation in antarctic phytoplankton; a CCAMLR ecosystem monitoring program; fisheries and the CCAMLR; resource management; and highlights of several SCAR meetings concerning biological sciences and global change research in Antarctica. An article discussing the possibility of Italian/French cooperation in the realization and management of a new scientific winter base, so far planned by the French at Dome C, and a schedule of future meetings, conclude this issue.

A-47023

Italy. Consiglio Nazionale delle Ricerche, **Ambiente Antartide, Sep. 1, 1991, No.3,** Rome, 1991, 31p., In Italian.

This issue begins by presenting an Italian translation of the 33 Articles of the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR), a description of the Antarctic Protocol, and a chronology of international conferences which brought it about. This is followed by the research section which presents a review of the uses of antarctic satellite and radar imaging data; an outline of future Italian oceanographic projects, including modeling, sea-ice-air relationship and ecology studies of the southern ocean; a description of studies of polar atmospheric physics and climatic changes; a discussion of the possibility of the development of an Italian glaciological program; a summary of preliminary results of, and future plans for, geological investigations in Victoria Land; an outline of the CNR activities in the 5-year program, dealing with the physiology of fish acclimatization, microbiology, limnology and international cooperation; and a description of the surface sediments of antarctic marine ecosystems. A schedule of future meetings concludes this issue.

A-47024

Italy. Consiglio Nazionale delle Ricerche, **Ambiente Antartide, Feb. 8, 1991. No.2,** Rome, 1991, 33p., In Italian.

This issue begins by presenting an Italian translation of the 14 Articles of the Antarctic Treaty and a discussion of the Italian antarctic scientific research within the framework of the Treaty. This is followed by: a review of the events leading to the implementation of the Italian National Antarctic Research Program (PNRA), and to that of a polar commission (Commissione Polare) charged with coordinating the polar activities of the National Research Council (CNR); a discussion of the role of the above organizations in polar investigations; and a list of the funded projects in the PNRA 1990-1991. The research section reviews the projects carried out by PNRA in its first 5-year plan in oceanography, atmospheric and terrestrial physics, meteorology, geology, biology, and environmental pollution. A list of new research proposals, a list of publications, brief news on satellite imaging systems available, and a schedule of future meetings, conclude this issue.

A-47056

Headland, R.K., **Historical review of antarctic ichthyology,** Fishes of the southern ocean, edited by O. Gon and P.C. Heemstra, Grahamstown, South Africa, J.L.B. Smith Institute of Ichthyology, 1990, p.1-5, Various abridged references are cited within the text.

DLC QL637.2 F57 1990

The review describes the course of antarctic fishing and fish research from about 1800 to about the mid-1980s. References to these enterprises contain very little about either during the early period, since the primary concerns of the sailors in these waters at that time were whaling and sealing. After a virtual break of about 100 years, interest was rekindled in ichthyological research and was characterized by basic taxonomic research. In the first half of the twentieth century, research combined taxonomic reviews with fundamental descriptive work. In the period after 1965, ecological and physiological studies increased while taxonomic studies became less prominent, although it appears that there is yet much to learn of taxonomic compositions, relationships, and the biogeography of fish in antarctic waters.

A-47133

New Zealand Antarctic Society, **Antarctic, Vol.12, No.8,** Christchurch, 1992, p.249-288.

Research activities carried out by New Zealand, China, Germany, Norway, Russia, South Africa, the United Kingdom and the United States are outlined. These include the following: a joint New Zealand-ANARE 9-week sledging program, passing for part of the time through unexplored territory in the Cook Mountains; an environmental program implemented at Zhongshan Station; details of the coming 1992-1993 GANOVEX VII Expedition; climate change studies; multidisciplinary investigations at Sanae, Marion I. and Gough I. stations; a description of Halley-5 research station and its science program; and details of the joint United States-Russia effort on the drift station Weddell I. News items cover the conservation organizations merger on Falkland Is., a sudden rise in temperature at Heard I.; a 30-year overview of the Antarctic Treaty; the removal of all dogs in the Treaty area by Apr. 1, 1994; an exhibition of the Japanese Antarctic Expedition; polar medal awards and the sale of a cache of photographs taken during Scott's expedition in 1910-1912.

A-47149

Campbell, D.G., **Crystal desert: summers in Antarctica,** Boston, MA, Houghton Mifflin Company, 1992, 308p., Refs. p.282-297.

A general history of Antarctica, a description of the plant and animal life, and personal observations during a summer stay at the Brazilian Comandante Ferraz Station on King George Island to do biological research, are presented. Adaptations, ecological niches, evolution, life cycles, feeding, predation, and effects of humans from both unintentional disturbance and hunting are described in nontechnical language. Plants and animals discussed include albatrosses, lichens, mosses, mites, midges, penguins, plankton, algae, amphipods, copepods, krill, diatoms, isopods, sponges, seals, fish, parasites, terns, skuas, and whales.

A-47150

Montevideo. Instituto Antártico Uruguayo, **Actividad científica 1987/88, Vol.3,** Sep. 1989, 134p., In Spanish. Refs. passim.

The publication includes 12 reports of investigations carried out at Artigas Station during 1986-1988 in the fields of meteorology, oceanography, cartography, geology, biology, ecology, medicine and psychology. For individual papers see B-47157 through B-47161, C-47155, E-47156, H-47162, I-47151 and J-47152 through J-47154.

A-47163

South Africa. Weather Bureau, **Newsletter/Nuusbrief, No.518, May 1992,** 1992, 28p., Text and titles in Afrikaans or English.

South African research activities on Marion and Gough islands, and at Sanae Station, along with general news items are reported. Presented are weather reports, including ozone measurements, with tables and graphs for the month of May, 1992. Hemispheric circulation anomalies during that month are discussed and illustrated.

A-47164

Australia. Antarctic Division, **ANARE news, No.70,** Kingston, Tasmania, 1992, 32p.

The principal feature presented in this issue deals with antarctic climate and global change, examining the reasons for the need to study climate, the role of Antarctica's energy processes in global climate, and the danger to antarctic sea ice from the greenhouse gas concentration as predicted in climate models. New information about the climate of East Antarctica, antarctic atmospheric studies supporting some surprising ideas, Australia's research on the climate-modifying role of aerosol particle, increased atmospheric turbidity recorded at Davis Station as a result of Pinatubo's eruption, the Law Dome project data on past climates, the importance of the upper atmosphere as indicator of climate change, and data on the biological role of antarctic marine life in climate change, are also covered in this section. Miscellaneous news on current and planned activities on Australian stations, review of recent publications, and weather summaries for Feb.-Apr. 1992 at Mawson, Davis, Casey and Macquarie I. conclude this issue.

A-47169

Speak, P., **William Speirs Bruce: Scottish nationalist and polar explorer,** *Polar record,* Oct. 1992 28(167), p.285-292, 20 refs.

William Speirs Bruce (1867-1921) had two consuming passions throughout almost the whole of his life: Scottish nationalism and polar science. His early life in London and Edinburgh is seen as a prelude to polar oceanographic exploration, culminating in the success of the *Scotia* antarctic expedition, 1902-04. His later life was frustrated by the limited achievements of the Scottish Spitsbergen Syndicate (which was founded to exploit the mineral resources of Svalbard), by a perceived prejudice against him in government and professional societies in London, and by the lack of support for his Scottish Oceanographical Laboratory. (Auth.)

A-47170

Herber, B.P., **Economic case for an antarctic world park in light of recent policy developments,** *Polar record,* Oct. 1992 28(167), p.293-300, 30 refs.

During the last several years, the Antarctic Treaty System has confronted the world park versus mining issue, resulting in the signing on Oct. 4, 1991, subject to ratification, of a protocol to the Antarctic Treaty, putting in place an environmental protection regime for Antarctica. This paper develops an economic case for the creation of a world park in Antarctica. The argument is based upon the international public good and common property resource characteristics of the seventh continent. The strength of the case is tested against the alternative economic uses of the Antarctic, especially mineral development. The possible creating of an antarctic world park is evaluated in light of the recent policy events. (Auth.)

A-47171

Beck, P.J., **1991 UN session: the environmental protocol fails to satisfy the Antarctic Treaty System's critics,** *Polar record,* Oct. 1992 28(167), p.307-314, 22 refs.

1991 saw the ninth successive United Nations (UN) discussion on the 'Question of Antarctica.' The adoption of two more resolutions critical of the Antarctic Treaty System (ATS), including South African participation therein, reaffirmed the unchanging nature of the UN episode and the lack of consensus on the management of Antarctica. Key developments affecting Antarctica continue to occur away from New York: during 1990-91 the negotiations conducted at Viña del Mar and Madrid for the Protocol on Environmental Protection to the Antarctic Treaty (PREP) and the measures agreed at the Bonn Antarctic Treaty Consultative Meeting proved the point. The critics of the ATS were appeased by neither PREP and its mining prohibition nor the recent dismantling of the apartheid regime in South Africa. Two UN reports were published on the state of the antarctic environment as well as the proposed establishment of a UN-sponsored research station in Antarctica. One resolution adopted in Dec. 1991 called for annual UN reports on the antarctic environment, although fiscal and other considerations meant that the research station proposal was effectively shelved. Another resolution urged South African exclusion from ATS meetings. The 10th annual UN discussion on Antarctica is scheduled for the close of 1992. There exists growing evidence that the critical campaign is losing momentum, although it seems premature to anticipate Antarctica's imminent demise as an UN agenda topic. (Auth.)

A-47173
Stone, I.R., **"To relieve those Shipwrecked": the Royal Navy and the Iles Crozet, 1876-77,** *Polar record,* Oct. 1992 28(167), p.318-321, 4 refs.

The history of the publication of two collections of correspondence dealing with the question of navigation in subantarctic waters, as it forced itself upon the British government in 1876, is reviewed. These publications are considered worthy of attention because of the information they impart concerning the extent of contemporary knowledge of the area.

A-47174
Stonehouse, B., **IAATO: an association of antarctic tour operators,** *Polar record,* Oct. 1992 28(167), p.322-324, 16 refs.

This note assesses IAATO's (International Association of Antarctic Tour Operators) record and its possible role in the development of legislation for antarctic tourism. IAATO Tour Operator Guidelines listing 18 points, designed particularly for shipborne operations, and Visitor Guidelines listing 16 points, are summarized.

A-47175
Scientific Committee on Antarctic Research, **SCAR bulletin No.107, October 1992,** *Polar record,* Oct. 1992 28(167), p.341-352.

SCAR bulletin No.107 consists of the following lists: Stations of SCAR nations operating in the Antarctic, winter of 1992, and its corresponding map; membership of SCAR and its subsidiary groups, providing names and addresses of individuals and/or organizations under these subdivisions: SCAR Executive Committee, honorary members, national committees, associated members, permanent delegates, alternate delegates and permanent working groups. The latter are listed by country and grouped under different disciplines.

A-47205
New Zealand Antarctic Society, **Antarctic, Vol.12, No.2/3,** Christchurch, [1992], p.42-92.

Research activities carried out by New Zealand, Australia, the United Kingdom, United States and Uruguay are outlined. Details are given of two parties of New Zealand, British and American geologists working in Marie Byrd Land and in the Robb/Lowrey Glacier; ANARE's 44th year of operation in Antarctica which began with the departure of the new icebreaker *Aurora Australis* from Hobart on Oct. 9, 1990, for a six week cruise to Prydz Bay to study krill; BAS logistical support for 1990-1991 scientific programs, including the completion of Phase II of the Rothera Point airstrip; the launching of the *James Clark Ross,* and Phase III of Halley reconstruction; USAP's balloon launch and cosmic ray studies in the summer program; and the development of the Uruguayan antarctic research program. Additional news concerns the resupplying of Campbell I., a new look at environmental protection and ban on minerals activities and highlights of the 42nd meeting of the International Whaling Commission, and Greenpeace activities during its 6th season in Antarctica.

A-47207
South Africa. Weather Bureau, **Newsletter/Nuusbrief, No.500, Nov. 1990,** 1990, 24p., Text and titles in Afrikaans or English.

Activities on Marion and Gough islands and at Sanae Station, along with general news items, are reported. Presented are weather reports, including ozone measurements, with tables and graphs for the month of Nov. 1990.

A-47208
Italy. Consiglio Nazionale delle Ricerche. Direzione Centrale Attiviá Scientifiche. Commissione di Studio per il Coordinamento della Ricerca Scientifica Polare, **Annual scientific objectives relative to the 1992-1993 Expedition to Antarctica** [Obiettivi scientifici annuali relativi alla spedizione in Antártide 1992-1993], Rome, 1992, 36p., In Italian. Ambiente Antártide (Special issue).

The projects to be carried out in the Italian antarctic research program during 1992-1993 are described in the 3 chapters of this volume under the following headings: Structure and geological evolution of the antarctic continent and of the southern ocean; global change; and observatories and geographic and other information. Specifically, the basic topics of the studies incorporated in the program are the lithospheric evolution of the antarctic Pacific paleomargin; the contemporary lithospheric structure of the Ross Sea; glacial processes related to global changes; paleoclimatology and sea-ice-air interaction; Earth-sun relationship; biology, ecology and environmental pollution; and instrumentation and methodologies relevant to the above research.

A-47226
Spain. Proyecto Español de Glaciología Antártica, **Contribution to the Antarctic Expedition 1988-1989. First results** [Contribución a la Campaña Antártica 88/89. Primeros resultados], [Madrid], E.T.S.I. Minas: Universidad Politecnica de Madrid, [1989], 101p., In Spanish. Refs. passim. For individual papers see 47-808 through 47-816 or E-47234, F-47227 through F-47233 and G-47235.

DLC GB2597.C86

This volume consists of 9 reports discussing preliminary results of investigations carried out at Juan Carlos I Station by members of the Spanish Antarctic Glaciological Project, based at the Universidad Politecnica de Madrid, during the Spanish Antarctic Expedition 1988-1989.

A-47302
Guthridge, G.G., **Antarctica bound—From New Zealand,** *Across the Pacific,* 1992 1(3), p.8.

The author, who is Manager of the Polar Information Program for the National Science Foundation in Washington D.C., outlines the ties that have bound New Zealand and the United States since 1957-58, when both countries established research stations on Ross I., 2,400 miles due south of Christchurch and the first "stop on the ice" after leaving New Zealand's South I., the gateway to Antarctica. It is pointed out that both countries have greatly benefited from their cooperation in antarctic operations and scientific research.

A-47366
Holden, C., ed, **Ice capade for science,** *Science,* July 3, 1992 257(5066), p.26.

This progress report tells of a joint US-Russian venture which began in Feb. 1992 on an ice station drifting in the Weddell Sea. Data gathered thus far suggest a necessary reassessment of how the region fits into the global climate system. An unexpected finding is that the continental slope off the Antarctic Peninsula is about 62 miles farther west than previously thought, a change that will affect extant models of ocean circulation. (See 46-1932/A-45460).

B. BIOLOGICAL SCIENCES

B-45067

Cooper, J., Brown, C.R., **Ornithological research at the sub-antarctic Prince Edward Islands: a review of achievements,** *South African journal of antarctic research,* 1990 20(2), p.40-57, With Afrikaans summary. Refs. p.54-57.

Twenty-nine species of birds are known or thought to breed at the Prince Edward Is. and a further 44 species have been recorded as nonbreeders. Recent census data are available for the larger, surface-nesting seabirds of Marion I., but not for the burrowing petrels or for most species breeding at uninhabited Prince Edward I. Penguins form the greatest percentage of the annual surface-nesting avifauna of the Prince Edward Is. There are two broad dietary groups: species obtaining their food exclusively from the sea, and those that forage, at least partially, terrestrially. The former group feeds primarily on crustaceans (21 taxa identified), cephalopods (53) and fish (20). Studies have been undertaken of digestive physiology of seabirds at the Prince Edward Is., including assimilation efficiency and digestion rates. The foraging ecology of Prince Edward I. penguins has been studied by the use of speed and dive meters. Physiological studies on seabirds at Marion I. have concentrated on measuring metabolic rates of nesting, moulting, incubating and foraging individuals of four species of penguins, the wandering albatross, and several species of burrowing petrels. Such measurements have been used to assess daily and total demands for maintenance and growth of several species.

B-45068

Wilkinson, I.S., Bester, M.N., **Continued population increases in fur seals, *Arctocephalus tropicalis* and *A. gazella,* at the Prince Edward Islands,** *South African journal of antarctic research,* 1990 20(2), p.58-63, With Afrikaans summary. 22 refs.

Population estimates of fur seals were obtained at the Prince Edward Is. during the 1987/88 and 1988/89 austral summers. The populations of *Arctocephalus tropicalis* at Marion I. and Prince Edward I. are increasing at a rate of 12.9% and 9.7% respectively. The Marion I. population is still in the recolonization phase of rapid growth, while the Prince Edward I. population is either still in the slow establishment phase or approaching maturity. The lack of previous data for Prince Edward I. prevents a comparison of growth rates. An apparent slowing of the rate of population growth in *A. gazella* at Marion I. is conceivably the result of undercounts in 1974, giving an overestimate of growth between 1974 and 1981. As a result of this undercount the importance of immigration to *A. gazella* numbers at Marion I. may have been overemphasized previously. The apparent failure of the *A. gazella* population to move past the slow establishment phase may be a result of the absence of krill *(Euphausia superba)* in the vicinity of the Prince Edward Is. Hybridization between the species is continuing. (Auth.)

B-45079

Thomsen, H.A., Buck, K.R., Bolt, P.A., Garrison, D.L., **Fine structure and biology of *Cryothecomonas* gen. nov. (Protista incertae sedis) from the ice biota,** *Canadian journal of zoology,* Apr. 1991 69(4), p.1048-1070, With French summary. 57 refs.

The morphology and ultrastructure of four species of *Cryothecomonas* gen. nov. (Protista incertae sedis) in material from the Weddell Sea and the Isefjord, Denmark, are described. These heterotrophic flagellates, which were initially observed in association with sea ice, display a unique combination of morphological characteristics. At present it is impossible to assign the new genus to an existing higher taxonomic level of protistan flagellates. *Cryothecomonas* species are furnished with a close-fitting multilayered theca. The two naked anterior flagella emerge through narrow thecal funnels. A transitional helix is part of the flagellar transition zone. A conspicuous cytostome is located in a posterior (lateral) position. Food uptake is mediated through the extension of cytostomal pseudopodia. The nucleus is anteriorly located and contains a conspicuous nucleolus and distinct areas of chromatin. Mitochondrial cristae are tubular. *Cryothecomonas* species feed on cells in the size range 2-4.5 microns (e.g., algal flagellates). Data are presented on the abundance of *Cryothecomonas armigera* sp. nov. in antarctic waters. (Auth.)

B-45081

Lopez Lastra, C.C., Reboredo, G.R., Spinedi, H.A., **First record of *Tolypocladium cylindrosporum* Gams (Deuteromycotima, Hypomycetes) for Antarctica. Preliminary considerations on its pathogenicity in *Culex pipiens* L. (Diptera, Culicidae) larvae** [Primer registro de *Tolypocladium cylindrosporum* Gams (Deuteromycotima, Hypomycetes) para la Antartida. Consideraciónes preliminares sobre su patogenicidad en larvas de *Culex pipiens* L. (Diptera, Culicidae)], *Buenos Aires. Instituto Antártico Argentino. Contribución,* 1991 No.392, 11p., In Spanish with English and French summaries. 13 refs.

The presence of the fungus *Tolypocladium cylindrosporum,* isolated from a soil sample at Primavera Base in Antarctica, is reported. A study was conducted of *Culex pipiens* larvae exposed to the fungus; mortality rates at different exposure duration and at different concentrations of *T. cylindrosporum* are discussed and presented in a table.

B-45085

Boyd, I.L., **Environmental and physiological factors controlling the reproductive cycles of pinnipeds,** *Canadian journal of zoology,* May 1991 69(5), p.1135-1148, Refs. p.1144-1148.

The reproductive pattern of pinnipeds is characterized by embryonic diapause, annual reproduction, and synchronous breeding cycles. Active gestation lasts about 8 months in most species, but the duration of embryonic diapause varies indirectly with the length of the postpartum oestrous cycle. The postpartum oestrus is marked by elevated oestradiol concentrations followed by a rise in progesterone levels after ovulation. An infertile cycle may lead to pseudo-pregnancy, although on rare occasions there may be a further period of oestrus. Progesterone concentrations remain elevated for the duration of pregnancy and chorionic gonadotrophin concentration in the placenta increases early in postimplantation. Sex steroids do not appear to be directly involved in blastocyst reactivation. The environmental factors influencing implantation appear to be the most significant proximate factors in timing pinniped reproductive cycles. Characteristics of the reproductive cycles of female pinnipeds, including all subantarctic and antarctic seals, showing timing of birth, fertilization and implantation, are presented in a table. (Auth. mod.)

B-45086
Harrison, P., Zummo, G., Farina, F., Tota, B., Johnston, I.A., **Gross anatomy, myoarchitecture, and ultrastructure of the heart ventricle in the haemoglobinless icefish *Chaenocephalus aceratus*,** *Canadian journal of zoology,* May 1991 69(5), p.1339-1347, 22 refs.

The gross and microscopic anatomy of the heart ventricle in the haemoglobinless icefish *Chaenocephalus aceratus* is described. The ventricle is saclike in shape and has a relative mass approximately 3 times greater than that of related "red-blooded" antarctic fish. The myocardium in *C. aceratus* is entirely trabecular and consists of myocytes, granulated noncontractile cells, and electron-dense interstitial spaces. Blood supply is through the venous lacunary circuit. In addition, two size classes of channels occur in the subepicardium, with mean diameters of 15 and 50 microns. The larger channels are connected directly with the intertrabecular spaces. The volume density of mitochondria is 0.47 in icefish myocytes, 0.15 in those of a tropical fish *(Astronotus ocellatus)* with a myoglobin-rich ventricle, and 0.27 in a cold-temperate fish *(Cyclopterus lumpus)* with a myoglobin-poor ventricle. The volume density of myofibrils in *C. aceratus* (0.25) is significantly less than in *A. ocellatus* (0.45) and *C. lumpus* (0.42). The data obtained are discussed in relation to present knowledge about the function of the heart in *C. aceratus* as a low-speed, large-volume pump. (Auth.)

B-45090
Sallaberry, M.A., Williamson, A.G., **Rock pigeon *Columba livia* and blue petrel *Halobaena caerula* on the South Shetland Islands, Antarctica,** *Polar record,* Oct. 1991 27(163), p.359, 6 refs.

The authors spent Jan. 1991 in the South Shetlands looking for unusual bird species. They found the keel, wings, and tail sufficiently clear for positive identification of a blue petrel. A rock pigeon was also seen on one occasion; it is most likely to have been a survivor of a group imported four years earlier by Chinese scientists at Great Wall Station.

B-45091
Pütz, K., Plötz, J., **Beak deformation in emperor penguin *Aptenodytes forsteri* chicks,** *Polar record,* Oct. 1991 27(163), p.367, 5 refs.

At an emperor penguin colony near Cape Vestkapp, two chicks with beak deformities were observed. In both cases the upper mandible was laterally deformed, one to the right and the other toward the left. Both appeared healthy and had begun to moult. Within ten days of the sighting, they left the colony along with about 100 other chicks.

B-45094
Coleman, C.O., Barnard, J.L., **Review of the genus *Pariphimedia* (Crustacea: Amphipoda:Iphimediidae) with redescription of two species from the southern ocean,** *Invertebrate taxonomy,* 1991 5(3), p.527-539, 13 refs.

Two of the three species of *Pariphimedia* from antarctic regions are redescribed as based on fresh material. A new generic diagnosis and a key to the species are provided. The described species are *P. normani* and *P. integricauda*. The third species, *P. incisa* was well described in 1985.

B-45095
Croxall, J.P., Naito, Y., Kato, A., Briggs, D.R., **Diving patterns and performances in the antarctic blue-eyed shag *Phalacrocorax atriceps*,** *Journal of zoology,* Oct. 1991 225(2), p.177-199, 40 refs.

The pattern and characteristics of diving of two male blue-eyed shags were studied, using continuous-recording time-depth recorders, for a total of 15 consecutive days during which the depth, duration bottom time, ascent and descent rates and surface intervals of 674 dives were recorded. Deep dives were twice as common as shallow dives. Deep dives were long, with half the time spent near maximum depth and at fast travel speeds. Shallow dives were short without bottom time and with slow travel speeds. The time spent at depth and the diet is consistent with benthic foraging; the function of shallow dives is uncertain. Male shags forage mainly in the afternoon in 3-5 distinct bouts of diving. Within bouts surface intervals are consistently 2-3 times the preceding dive duration; in other shags the reverse is the case. Blue-eyed shag diving depth, duration and pattern is extreme amongst shags; and the relationship between dives and surface intervals suggests that they may regularly exceed their aerobic dive limit. (Auth. mod.)

B-45104
Lemaire, L., **Observation of Royal Shags *Phalacrocorax albiventer* presenting unusual characteristics of plumage in the Kerguelen Archipelago** [Observation de Cormorans à ventre blanc *Phalacrocorax albiventer* présentant des caractéristiques de plumage inhabituelles dans l'archipel Kerguelen (48 deg 27 min à 50S-68 deg 27 min à 70 deg 35 min E)], *L'oiseau et la revue française d'ornithologie,* 1989 Vol.59, p.223-225, In French. 15 refs.

The plumage of two shags sighted on the north point of Suhm I. in the Morbihan Gulf, and in the Sourcils Noirs Canyon in Aug. and Dec., 1987, respectively, was similar to that of other shags in the area, except for a display of white feathers on top of their heads and the absence of a crest. Taxonomic implications are briefly discussed.

B-45159
Lequette, B., Jouventin, P., **Dance of the Wandering Albatross II: acoustic signals,** *Emu,* Sep. 1991 91(3), p.172-178, 32 refs.

Wandering Albatross *Diomedea exulans* acoustic signals were studied on the Crozet Archipelago. The first description of 9 signals (comprising 5 vocalizations) with their characteristics is given. The repertoire of acoustic signals found in the Wandering Albatross is compared with that of other species of albatrosses. Sexual differences were apparent in the main vocalization, the 'yapping' call, performed between mates. The strong links between visual and acoustic repertoires are discussed and the biological function of acoustic signals is proposed. (Auth.)

B-45161
Wilson, R.P., Culik, B.M., **Cost of a hot meal: facultative specific dynamic action may ensure temperature homeostasis in post-ingestive endotherms,** *Comparative biochemistry and physiology,* 1991 100(1), p.151-154, 17 refs.

Resting metabolic rate was determined in Adélie penguins that had been fed warm and cold ingesta. Post-ingestion metabolic rate was related to food temperature rather than to specific dynamic action. Calorimetric calculations indicate that up to 13% of Adélie penguin daily energy expenditure may be used in heating ingested food to body temperature. Heating food costs are predicted to be higher in endotherms living in cold regions and in species with low assimilation efficiencies, but may be minimized by appropriate foraging behavior. (Auth.)

B-45163
Lacy, T.G., **Bird life in the Falkland Is.** [Fuglaskodunarferd til Falklandseyja], *Natturufraedingurinn,* 1991 61(1), p.17-23, In Icelandic with English summary. 1 ref.

Unlike Iceland, the Falkland Is. are not basaltic and have no main landmass; they are divided into two main islands and many smaller ones. The summer climate is very like Iceland, but the winter climate is milder, as the islands do not lie as far south as Iceland lies north. There is a shortage of insectivora and therefore of passeriformes. Various species found in Iceland have their counterparts in the Falklands, such as gulls, tern, and thrush; but the Falklands fauna includes 5 nesting species of penguins as well as sea elephants. (Auth.)

B-45164

Nicol, S., Stolp, M., Hosie, G.W., **Accumulation of fluorescent age pigments in a laboratory population of antarctic krill *Euphausia superba* Dana,** *Journal of experimental marine biology and ecology,* Apr. 15, 1991 146(2), p.153-161, Refs. p.160-161.

Age-class separation by morphometric means has proved difficult for the krill *Euphausia superba* because the size of the animals does not necessarily relate to their age in any predictable fashion. The measurement of temporal increases in quantities of fluorescent age-pigments has been suggested as a method which obviates the problems associated with size-related measures of age. In this study, a laboratory population of krill exhibited a clear increase in the mean amount of fluorescent age-pigment per animal over a period of 1 yr. At the same time the mean weight of the animals in the population decreased markedly. Analyses of fluorescence- and weight-frequency plots from samples taken a year apart demonstrated that the fluorescence technique could successfully distinguish the two year groups and determine their correct temporal sequence, whereas the weight frequency analysis was less successful at distinguishing the two peaks and placed them in an incorrect temporal sequence. On the basis of these results it is suggested that age-pigment fluorescence may now be a useful tool in the analysis of age structure in krill populations. (Auth.)

B-45165

Blot, M., Legendre, B., Albert, P., **Restriction fragment length polymorphism of mitochondrial DNA in subantarctic mussels,** *Journal of experimental marine biology and ecology,* Sep. 18, 1990 141(2-3), p.79-86, Refs. p.85-86.

Mitochondrial DNA (mtDNA) variation in samples of the marine mussel *Mytilus desolationis* Lamy 1936 from two localities in the Kerguelen Is. are analyzed by the restriction fragment length polymorphism (RFLP) method to test for panmixia among the genetic regions previously established with enzyme polymorphism data. The results of EcoRI digestions and the reduced level of DNA polymorphism inside of the archipelago compared to oceanic coasts give evidence for the absence of panmixia. Genetic data are related to the hydrology of the archipelago. It is proposed that larvae from external oceanic coasts cannot enter the Gulf of Morbihan. In the particular context of isolation from continental masses of the Kerguelen Archipelago, these results provide an opportunity to combine estimations of migration rate to those of natural selection in an island model. (Auth.)

B-45170

Johnston, C.G., Vestal, J.R., **Photosynthetic carbon incorporation and turnover in antarctic cryptoendolithic microbial communities; are they the slowest-growing communities on Earth,** *Applied and environmental microbiology,* Aug. 1991 57(8), p.2308-2311, 21 refs.

The main forms of terrestrial life in the cold, desolate Ross Desert of Antarctica are lichen-dominated or cyanobacterium-dominated cryptoendolithic (hidden in rock) microbial communities. Though microbial community biomass (as measured by extractable lipid phosphate) was well within the range of values determined for other microbial communities, community lipid carbon turnover times were among the longest on Earth (ca. 20,000 years). When the temperature is above freezing and moisture is present, moderate rates of photosynthesis can be measured. Lichen communities had a psychrophilic temperature response (maximal rate of 4.5 ng of C/h/sq m at 10 C) while cyanobacteria communities had maximal rates of 20 to 30 C (3 ng of C/h/sq m). These extraordinarily slowly growing communities were not nutrient limited. No significant changes in photosynthetic metabolism were observed upon additions of 100 nM to 1 mM nitrate, ammonium, phosphate, and manganese. These simple, tenacious microbial communities demonstrate strategies of survival under conditions normally considered too extreme for life. (Auth. mod.)

B-45171

Laybourn-Parry, J., Marchant, H.J., Brown, P., **Plankton of a large oligotrophic freshwater antarctic lake,** *Journal of plankton research,* Nov. 1991 13(6), p.1137-1149, Refs. p.1148-1149.

The planktonic community of Krok Lake, a large freshwater lake in the Vestfold Hills, was investigated during the summer of 1990. Very low levels of chlorophyll *a* were recorded. The phytoplankton was largely made up of colored flagellates, including single species of *Chlamydomonas, Ochromonas* and *Peridinium,* which occurred in low concentrations. Heterotrophic colorless flagellates, including *Paraphysomonas vestita,* were also relatively sparse. Ciliated protozoans were particularly poorly represented. Only three species occurred reaching densities of about 100/l, and among them the mixotrophic species *Strombidium viride* was the most common. A single species of heliozoan *Actinosphaerium* and relatively large numbers of naked amoebae were the sarcodine representatives. The protistan community and the bacteria were concentrated into microbial consortia associated with flocs of particulate organic matter probably derived from the benthic algal mat. Of the two microcrustacean zooplankters recorded from the lake only *Daphniopsis studeri* was found breeding in the plankton in very low numbers. The behavioral and physiological adaptations of the organisms inhabiting this extremely oligotrophic environment are discussed.

B-45173

Garrison, D.L., Watanabe, K., **Microbial assemblages in antarctic sea ice: a comparison of the pack and land-fast ice habitats,** International Symposium on Okhotsk Sea and Sea Ice, 6th, Mombetsu, Hokkaido, Japan, Feb. 3-6, 1991. Abstracts, Mombetsu, Hokkaido University, Okhotsk Sea and Cold Ocean Research Association, 1991, p.80-88, 55 refs.

The ice surrounding Antarctica is an extensive, highly seasonal habitat. Assemblages comprised of algae, heterotrophic protozoans and metazoans inhabit much of the sea ice. The high concentration of organisms associated with ice has suggested that this may be an important site of production in polar oceans. Until the late 1970s studies were concentrated in the nearshore, land-fast ice, and most studies were during the summer months. In the last decade, however, there have been a number of studies in the pack ice regions and observations have included the winter months. It is now apparent that there are several distinct habitats in antarctic sea ice. Organisms may occupy the surface, the interior, or the bottom layers of ice floes. The distribution of the ice biota varies throughout the ice covered regions. Although there are exceptions, it is generally reported that surface-layer and interior assemblages are most common in drifting pack ice, whereas bottom-layer assemblages characterize the land-fast ice. Differences in the environmental regimes of the nearshore and offshore regions appear to explain the major features of the distributions. Ice-associated assemblages vary in their characteristic biomass concentrations and apparently in their population dynamics. The ice-associated algae have been extensively studied. (Auth.)

B-45174

Raymond, J.A., Sullivan, C.W., DeVries, A.L., **Ice-active substance from antarctic sea ice diatoms,** International Symposium on Okhotsk Sea and Sea Ice, 6th, Mombetsu, Hokkaido, Japan, Feb. 3-6, 1991. Abstracts, Mombetsu, Hokkaido University, Okhotsk Sea and Cold Ocean Research Association, 1991, p.89-92, 11 refs.

Microalgae found in the sea-ice layer contribute significantly to the productivity of the polar oceans. The ice layer, with its many ice platelets, channels and pockets, provides numerous habitats in which microbial communities can become established. Diatoms, the main constituents of the microalgae, exist both attached to the ice and in close association with the ice. Ice diatoms excrete a number of low molecular weight metabolites as well as high molecular weight polysaccharide mucilages of varying solubility. Among attached diatoms, the mucilages act as adhesives, but they may have other roles as well. Recent preliminary work has shown that sea-ice diatoms in McMurdo Sound excrete a novel high molecular weight, water-soluble substance that has a profound effect on the growth of ice in the platelet layer. The substance appears to adsorb to growing ice and causes dense pitting on the platelet surfaces. The radical alteration of ice crystal surfaces by this substance suggests that it may play a role in the sea ice community where ice surfaces are the principal substrate. (Auth. mod.)

B-45175

Seberg, O., **Biometrical analysis of the South American *Elymus glaucescens* complex *(Poaceae: Triticeae)*,** *Plant systematics and evolution,* 1989 166(1/2), p.91-104, 31 refs.

DLC QK1.O26

Based on a simple multivariate analysis of the morphology of the *Agropyron pubiflorum* complex—*A. patagonicum, A. antarcticum, A. fuegianum,* and *A. magellanicum*--the variation pattern is shown to be clinal, and all taxa are included in a single, variable species. Currently the majority of species of *Agropyron* is included in *Elymus* and the correct name of this species is *E. glaucescens.* The geographical distribution of this species extends through southern Patagonia, Tierra del Fuego, and the Falkland Islands. (Auth. mod.)

B-45176

Chen, X.Q., Dieckmann, G., **Distribution of chlorophyll *a* and diatom in the sea ice of the Weddell Sea, Antarctica,** *Acta oceanologica sinica,* 1991 10(1), p.161-166.

Diatoms are major producers of microbial biomass in Antarctica. They are found in the water and sea ice. The distribution and abundance of ice diatoms and their relation to environmental factors inside and outside the ice have been studied to determine their special role in the antarctic ocean ecology. In this paper the abundance, distribution and composition of diatom assemblages in sea ice cores is described. The possible mode of incorporation into sea ice and the etiology of different assemblages are discussed. (Auth. mod.)

B-45178

McClintock, J.B., Heine, J., Slattery, M., Weston, J., **Biochemical and energetic composition, population biology, and chemical defense of the antarctic ascidian *Cnemidocarpa verrucosa* Lesson,** *Journal of experimental marine biology and ecology,* May 16, 1991 147(2), p.163-175, Refs. p.173-175.

The biochemical and energetic composition, population biology and chemical defense of the antarctic ascidian *Cnemidocarpa verrucosa* Lesson was investigated at McMurdo Sound during the summer of 1989. The organic content (% organic material/g dry tissue wt) of individual body components (tunic, body wall, endocarps, intestines, mature ovitestes and branchial basket) was generally high, with values ranging from 44.5% in the endocarps to 83.9% in the gonads. Most of this material was in the form of NaOH-soluble and insoluble protein. Population densities of *C. verrucosa* at depths of 20-30 m were 0.4 ind/sq m at a site 3 km north of McMurdo Station. Energetic densities were estimated to be 197 kJ/sq m. Size-frequency analysis revealed four modal peaks that probably represent distinct age cohorts, and may indicate predictable annual recruitment events. Bioassays revealed that the tunic was noxious to sympatric pelagic and benthic fish, as well as an allopatric model fish. However, aqueous tunic extracts did not cause mortality in sea urchin sperm, indicating the noxious compound(s) is not cytotoxic. pH values for body components were weakly acidic or neutral (5.86-6.93). Mature ovitestes were rejected by sympatric pelagic fish, suggesting that gametes may be chemically defended. Although this common antarctic ascidian represents a significant resource of materials and energy, its tunic is tough and noxious, and probably provides an effective means of defense against potential predators. (Auth. mod.)

B-45180

Yamada, S., Tanimura, A., Minoda, T., **Copepods collected along 13E longitude of the antarctic ocean in the 1973 Summer,** *Antarctic record,* July 1991 35(2), p.155-160, 11 refs.

Zooplankton samplings were conducted at 8 stations in the Indian sector of the antarctic ocean along 13E from Feb. 27 to Mar. 3, 1973. Vertical hauls from 200 m to the surface with a Norpac net (45 cm in diameter, 0.33 mm mesh openings) were carried out. Copepoda occupied more than 80% of the total numbers of zooplankton at all stations. Fifteen species were recorded. *Calanus propinquus, Calanoides acutus, Ctenocalanus vanus* and *Oithona similis* were numerically important components. *C. propinquus, C. acutus* and *C. vanus* occurred abundantly at three stations between 60 and 63S; *O. similis* was abundant near 56 and 62S. Eleven other species, *Calanus simillimus, Rhincalanus gigas, Clausocalanus laticeps, Euchirella rostromagna, Euchaeta antarctica, Racovitzanus antarcticus, Scolecithricella glacialis, Metridia lucens, Metridia gerlachei, Heterorhabdus austrinus* and *Haloptilus oxycephalus* were small in numbers. (Auth. mod.)

B-45183

Ohyama, Y., **Biological surveys in the Sör Rondane Mountains, Dronning Maud Land, in 1989 and 1990 seasons,** *Antarctic record,* July 1991 35(2), p.238-246, 22 refs.

From 1986 to 1990, a survey of terrestrial biology was carried out as one of the main projects of the Japanese Antarctic Research Expedition, corresponding to the international BIOTAS program. The terrestrial ecology was studied by wintering personnel during the first three years. This report deals with the research activities conducted in the Sör Rondane Mountains, during the last two summer seasons. The 1989 survey was made in the western part of the Mountains by means of snow vehicles, and the 1990 survey covered the entire area of the Mountains by using helicopters. Lichens were widely distributed in the Mountains, but well-developed communities of mosses and algae were restricted to the western part of the Mountains. One springtail and several mite species were also found in these western areas and Mount Griffiths, which is located in the central part of the Mountains. (Auth. mod.)

B-45191

Wilson, R.P., Culik, B., Danfeld, R., Adelung, D., **People in Antarctica—how much do Adélie penguins *Pygoscelis adeliae* care,** *Polar biology,* Oct. 1991 11(6), p.363-370, Refs. p.369-370.

In the course of physiological field studies the effects of humans and aircraft were examined on breeding Adélie penguins *Pygoscelis* *adeliae.* Proximity to both aircraft and humans caused substantial increases in penguin heart rate even when no external stress was manifest. A solitary human at 20 m distance from commuting penguins on a well-used pathway caused the birds to deviate by 70 m. Birds at nests exposed to a single human fled much more readily when the brood consisted of large chicks (critical distance 6.1 m) rather than small chicks (critical distance 1.3 m) or eggs (critical distance 0.3 m). Aircraft caused birds to panic at distances greater than 1,000 m, and 3 days exposure to a helicopter inhibited birds that had been foraging from returning to their nests, caused bird numbers in the colonies to decrease by 15% and produced an active nest mortality of 8%. Based on this data, recommendations are made to minimize stress on Adélie penguin colonies exposed to man. (Auth.)

B-45192

Montecino, V., Pizarro, G., Cabrera, S., Contreras, M., **Spatial and temporal photosynthetic compartments during summer in antarctic Lake Kitiesh,** *Polar biology,* Oct. 1991 11(6), p.371-377, Refs. p.376-377.

Four autotrophic compartments were recognized in Lake Kitezh at the beginning of the summer in 1987: snow microalgae, ice bubble communities, phytoplankton in the water column and benthic communities of moss with epiphytes. Chlorophyll *a* concentration and pigment absorption spectra were obtained in these four compartments before and/or after the thawing of the ice cover. During the ice free period, carbon fixation and biomass were measured in the phytoplankton and in the benthic moss *Campyliadelphus polygamus.* From these measurements, it is concluded that the benthic moss is the most significant autotrophic component in this lake in terms of biomass, chlorophyll *a* content and primary productivity. The integral assimilation number (the ratio of carbon fixation per unit area to biomass per unit area) values were similar for both phytoplankton and the moss. This approach allows comparisons of carbon fixation efficiency of the chlorophyll *a* under a unit area between compartments in their different light environments. (Auth. mod.)

B-45193

Whitehead, M.D., Burton, H.R., Bell, P.J., Arnould, J.P.Y., Rounsevell, D.E., **Further contribution on the biology of the antarctic flea, *Glaciopsyllus antarcticus* (Siphonaptera: Ceratophyllidae),** *Polar biology,* Oct. 1991 11(6), p.379-383, 10 refs.

Experiments showed that adult antarctic fleas *Glaciopsyllus antarcticus* preferred dark over light conditions, dry over wet conditions, and fine substrate over coarse substrate. Examination of seabird chicks and collections of nest material indicated that the Southern Fulmar *Fulmarus glacialoides,* is the major host species of the antarctic flea, while Snow Petrels *Pagodroma nivea,* Cape Petrels *Daption capense,* Antarctic Petrels *Thalassoica antarctica,* and Wilson's Storm-Petrels *Oceanites oceanicus* are minor hosts. This is the first report of antarctic fleas occurring on either Antarctic Petrels or Wilson's Storm-Petrels. No fleas were found associated with Southern Giant Petrels *Macronectes giganteus,* Antarctic Skuas *Catharacta maccormicki,* or Adélie penguins *Pygoscelis adeliae.* No live fleas were found in Southern Fulmar nest material during their period of dispersal over the winter months, supporting the hypothesis that antarctic fleas survive the winter period by remaining on their seabird host. (Auth.)

B-45194

Gleitz, M., Kirst, G.O., **Photosynthesis-irradiance relationships and carbon metabolism of different ice algal assemblages collected from Weddell Sea pack ice during austral summer (EPOS 1),** *Polar biology,* Oct. 1991 11(6), p.385-392, Refs. p.391-392.

In a study of algae in Weddell Sea pack ice, infiltration and interstitial assemblages exhibited the photosynthetic characteristics of high-light adapted ice algae. A higher light harvesting efficiency under light limited conditions, as well as a lower light intensity for light saturation, was determined for the interstitial assemblage. An increase in light intensity from 3.5 to 106 micro-mol/sq m/s resulted in increased synthesis of polymeric carbohydrates (presumably reserve material) in a band assemblage. However, the absolute incorporation of radiolabel into lipid- and amino acid fractions remained essentially constant over this range of photon flux densities. Light-saturated rates of photosynthesis of three infiltration assemblages under hypersaline conditions decreased by 13-55%. The adverse effect of salinity treatment was much less pronounced under hypersaline conditions. These observations suggest that sea ice microalgae in the ice edge region of the Weddell Sea during spring, being in a metabolically active stage, may have the potential to initiate or contribute to phytoplankton blooms upon release into the water column. (Auth. mod.)

B-45195

Kappen, L., Breuer, M., Bölter, M., **Ecological and physiological investigations in continental antarctic cryptogams. 3. Photosynthetic production of *Usnea sphacelata:* diurnal courses, models, and the effect of photoinhibition,** *Polar biology,* Oct. 1991 11(6), p.393-401, Refs. p.400-401.

Microclimate and CO2 exchange of the lichen *Usnea sphacelata* were measured during summer on a hill near Casey Station. Within a period of 52 days (Nov. 10-Dec. 31, 1985), 8 diurnal courses of net photosynthesis were measured in naturally snow-covered lichen thalli, and 9 diurnal courses in thalli experimentally sprayed with melt water. Photosynthetic performance of a light-form of *U. sphacelata* was compared with that of a shade-form. Net photosynthesis was reversibly depressed in snow-covered lichen thalli of both forms when irradiance was higher than 600 micro-mol/sq m/s photosynthetic active radiation (PAR), the depression persisting several hours after a period of strong light. These responses suggest photoinhibition. The study has shown that long-term calculation of the photosynthetic productivity must take into account decreases in net photosynthesis rate caused by strong light, as well as effects of water content and temperature. For the investigated period of the austral summer, a carbon production of 3.44 g/sq m was estimated for *U. sphacelata.* (Auth. mod.)

B-45196

Robarts, R.D., Sephton, L.M., Wicks, R.J., **Labile dissolved organic carbon and water temperature as regulators of heterotrophic bacterial activity and production in the lakes of subantarctic Marion Island,** *Polar biology,* Oct. 1991 11(6), p.403-413, Refs. p.412-413.

The objectives of the 3 year study were to determine the relationship between bacterial numbers and phytoplankton standing crops (chlorophyll *a)* in subantarctic Marion I. lakes, and to determine the relative importance of labile dissolved organic carbon and water temperature as regulators of heterotrophic bacterial activity and production. Bacterial activity was measured in oligotrophic Lava Lake and Gentoo Lake, an elephant seal wallow. Samples were incubated under ambient conditions as well as at increased temperature and with additions of labile dissolved organic carbon (DOC). Bacterial numbers were not correlated to chlorophyll concentration in waters where the chlorophyll content was 5 micrograms/l but were correlated in waters with larger algal contents. Heterotrophic bacterial activity and production, which were similar to rates recorded for equivalent lower latitude systems, were higher in Gentoo Lake than in Lava Lake. As a result of qualitative and quantitative differences in the DOC pools, DOC was the stronger regulator of bacterial activity and production in Lava Lake, while temperature was the stronger factor in Gentoo Lake. (Auth. mod.)

B-45218
Everson, I., Goss, C., **Krill fishing activity in the southwest Atlantic,** *Antarctic science,* Dec. 1991 3(4), p.351-358, 18 refs.

Commercial krill fishing has been undertaken in the southern ocean for 20 years. Recently the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) introduced a reporting scheme to summarize catch data from half degree of latitude by one degree of longitude rectangles. These data demonstrate that commercial fishing in the southwest Atlantic is concentrated in the shelf zone. Certain krill predators are also restricted to this area whilst collecting food for their young during the summer. Krill fishing takes place year round, moving northwards in winter as the ice edge advances. (Auth.)

B-45219
Green, K., Williams, R., Burton, H.R., **Diet of antarctic fur seals during the late autumn and early winter around Heard Island,** *Antarctic science,* Dec. 1991 3(4), p.359-361, 8 refs.

The diet of antarctic fur seals around Heard I. was investigated in May and June 1990. Fish predominated in samples, occurring in an average of 93.4% of droppings. Otoliths from pelagic fish (mainly myctophids) constituted over 96% of all otoliths. There was an increase in the occurrence of squid from 3.4% in summer 1987/88 to 49.3% in the present study. For the fish species *Gymnoscopelus nicholsi* (Gilbert), 10.3% of otoliths recovered from scats were considered suitable for measurement compared with 30.5% from scats at Heard I. in 1987/88; this greater level of erosion provides further evidence that the seals were foraging farther afield. The study demonstrates a significant difference between summer 1987/88 and winter 1990. (Auth.)

B-45220
Gutt, J., Gorny, M., Arntz, W., **Spatial distribution of antarctic shrimps (Crustacea: Decapoda) by underwater photography,** *Antarctic science,* Dec. 1991 3(4), p.363-369, 41 refs.

Three species of shrimps *(Notocrangon antarcticus, Chorismus antarcticus, Nematocarcinus lanceopes)* were investigated in the southeastern Weddell Sea using underwater photography. Maximum densities of *c.* 100 specimens per 100 sq m were found for *N. antarcticus* on the continental shelf (200-600 m) and for *N. lanceopes* on the slope (800-1200 m). Small-scale dispersion patterns and size-frequency distributions were analyzed within dense concentrations. These direct observations indicate that the behavior of the three species is adapted to different habitats, with *Chorismus* distribution correlated with that of sponges and *Notocrangon* with base sediment. (Auth.)

B-45221
Joiris, C.R., Overloop, W., **PCBs and organochlorine pesticides in phytoplankton and zooplankton in the Indian sector of the southern ocean,** *Antarctic science,* Dec. 1991 3(4), p.371-377, 20 refs.

Samples of phyto- and zooplankton were collected in the Indian Ocean and analyzed for organochlorine residues (PCBs and pesticides). PCB concentration in particulate matter (mainly phytoplankton) appeared to be high and similar to that of temperate zones. Contamination levels were more constant when expressed per water volume than per dry weight, and seven times lower than in northern temperate zones. The antarctic ecosystems are thus less contaminated than temperate ones, but the very low phytoplankton biomass present cause high PCB levels per unit of biomass. These results confirm the necessity of using different systems of units in order to correctly express the contamination levels and to identify the main mechanisms responsible for the accumulation of stable pollutants. Netplankton contamination is comparable in the Antarctic and the North Sea, since zooplankton feeding on phytoplankton has similar levels of contamination in both ecosystems. Lindane, heptachlor epoxide, dieldrin, DDE and DDT were observed in various samples at trace levels. The high DDE/DDT ratio reflects the more recent origin of antarctic organochlorines. (Auth. mod.)

B-45222
Schmidt, S., Moskal, W., De Mora, S.J., Howard-Williams, C., Vincent, W.F., **Limnological properties of antarctic ponds during winter freezing,** *Antarctic science,* Dec. 1991 3(4), p.379-388, 22 refs.

Two shallow ponds at Cape Evans, Ross I., were sampled at 1-2 weeks intervals during winter freezing throughout the winter and during the subsequent melt period, to examine the physical and chemical conditions imposed on the biota during the year. Liquid water was first detected at the base of the ponds in late Dec. During the main summer melt period conductivities were less than 10 mS/cm with maximum daily temperatures around 5 C. The bottom waters became increasingly saline during freezing and water temperatures decreased below 0 C; by June the remaining water overlying the sediments had conductivities >150 mS/cm and temperatures of -13 C. Calcium carbonate, then sodium sulphate precipitated out of solution during early freezing. This study provides clear evidence that organisms which persist throughout the year in antarctic coastal ponds must be capable of surviving much more severe osmotic, pH, temperature and redox conditions than those measured during the summer melt. Deoxygenation, pH decline and H2S production, however, point to continued respiratory activity well into the dark winter months. (Auth. mod.)

B-45237
Heine, J.N., McClintock, J.B., Slattery, M., Weston, J., **Energetic composition, biomass, and chemical defense in the common antarctic nemertean *Parborlasia corrugatus*,** *Journal of experimental marine biology and ecology,* Nov. 12, 1991 153(1), p.15-25, 39 refs.

Parborlasia corrugatus McIntosh is a large, abundant, epibenthic antarctic nemertean which represents a considerable source of nutrition for predators. The energetic composition of adult body tissues is comprised primarily of energy derived from protein. Energy units associated with lipid and carbohydrate are much lower. Based on calculations of the energetic composition of whole body tissues, and a density of 0.3 ind/sq m, mean population energetic density is estimated to be 65 kJ/sq m. These values are often significantly higher as *P. corrugatus* aggregates when feeding. Despite their high abundance, nemerteans are not preyed upon and appear to be chemically defended. Sperm of the antarctic sea urchin *Sterechinus neumeyeri* (Meissner) were killed when exposed to a 3% aqueous extract of whole nemertean body tissues. In laboratory feeding experiments, two common species of antarctic fish showed significant rejection of nemerteans. Its toxic and feeding-deterrent characteristics are probably the result of the epithelial production of copious acidic mucus, although other toxic or noxious metabolites may be present. These results indicate that *P. corrugatus,* an important scavenger in antarctic benthic systems, is abundant, high in nutrients and energy content, and could be judged on this basis as a high quality prey item. Nonetheless, due to its chemical defense, potential predators may avoid ingestion of this species. (Auth.)

B-45252
Anderson, M.E., **Studies on the Zoarcidae (Teleostei:Perciformes) of the Southern Hemisphere. V. Two new species from the Weddell Sea, Antarctica,** *Cybium,* June 29, 1991 15(2), p.151-158, 6 refs.

Two new species of deep-water eelpouts are described from specimens trawled in the Weddell Sea. One, *Lycenchelys xanthoptera,* is characterized by its yellow pectoral fins, absence of pelvic fins and palatine teeth, double lateral line, intermediate counts of the axial skeleton, and relatively few suborbital pores (5-6). The other, *Pachycara goni,* is characterized by its furcate gill rakers, mediolateral branch of the lateral line beginning on the tail, high precaudal vertebral count (27), and seven suborbital pores, all below the eye. (Auth.)

B-45254

Karsten, U., Wiencke, C., Kirst, G.O., **Effect of salinity changes upon the physiology of eulittoral green macroalgae from Antarctica and southern Chile. I. Cell viability, growth, photosynthesis and dark respiration,** *Journal of plant physiology,* 1991 138(6), p.667-673, Refs. p.672-673.

The salinity tolerance of the eulittoral green macroalgae *Ulothrix implexa, Ulothrix subflaccida, Enteromorpha bulbosa* and *Acrosiphonia arcta* from Antarctica was determined. Cell viability, growth, photosynthesis and dark respiration were used as criteria. A subantarctic-cold temperate *Ulva rigida* from southern Chile was also included in this study. Cells of *U. implexa, E. bulbosa* and *A. arcta* showed considerably broader salinity tolerance than cells of *U. subflaccida* and *U. rigida.* All investigated species grew well under a wide range of salt treatments. With the exception of *U. implexa,* growth rates of all other species were inhibited at the lowest salinity tested. After incubation under extreme hypersaline conditions all species responded with a strong reduction in growth. The photosynthesis and dark respiration responses were similar to those of growth. These very plastic physiological properties under different salinities are similar between antarctic and temperate plants. The successful spreading of green macroalgae in the eulittoral zone of all continents including cold Antarctica and cold-temperate southern Chile may thus be explained. (Auth.)

B-45256

Smith, W.O., Jr., Harrison, W.G., **New production in polar regions: the role of environmental controls,** *Deep-sea research,* Dec. 1991 38(12A), p.1463-1479, Refs. p.1477-1479.

The effects of temperature, nutrient concentrations and irradiance on nitrogen uptake were investigated in diverse (arctic and antarctic) polar environments by analyzing experimental data as well as previously published results. The effect of temperature on nitrogen uptake was found to be similar to its effect on photosynthesis, with Q10 values slightly greater than 2. Phytoplankton showed a saturation response to nitrogen (nitrate, ammonium and urea) concentrations. The coupling of irradiance to nitrogen uptake was significantly different from that of carbon. Ammonium and nitrate uptake saturated at lower irradiances than carbon uptake (<10 vs 30-35 W/sq m), and nitrate uptake showed the greatest photoinhibition. A significant amount of ammonium was removed in darkness, which is consistent with the trends observed in field studies. Ratios of carbon:nitrogen uptake throughout the water column were inconsistent with the observed C:N ratios in the particulate matter. (Auth. mod.)

B-45260

Veit, R.R., Hunt, G.L., Jr., **Broadscale density and aggregation of pelagic birds from a circumnavigational survey of the antarctic ocean,** *Auk,* Oct. 1991 108(4), p.790-800, Refs. p.798-800.

The spatial distribution and habitat relationships of pelagic birds were analyzed on a circumnavigational cruise of Antarctica, focusing on 2 issues: a quantitative description of the structure of antarctic seabird assemblages, and the use of 18 crossings of the edge of the pack ice and 15 crossings of the continental slope, to clarify the spatial relationship between aggregations of pelagic birds and these physical features. The analysis corroborates the uniformity of bird species composition over the longitudinal range covered. It is found that the habitats with light (2/10 to 6/10 coverage) pack-ice cover have the lowest density and biomass of birds of the 4 ice habitats (open water, icebergs only, light pack ice, heavy pack ice) surveyed. Even though overall bird abundance is not concentrated at the ice edge, aggregations of individual species are statistically likely to appear there. Only a slight (34%) elevation in bird biomass over the continental slope is found, despite repeated previous findings of bird aggregations associated with the antarctic slope front. Finally, 45% of the seabirds observed are in 3 large aggregations. This concentration demonstrates the importance of localized patches of prey to foraging seabirds in the Antarctic. (Auth. mod.)

B-45261

Harrison, N.M., **Observations of multispecies seabird flocks around South Georgia,** *Auk,* Oct. 1991 108(4), p.801-810, Refs. p.809-810.

One hundred ninety-five multispecies feeding flocks of birds were observed near Bird I. between Feb. 4 and Mar. 5, 1986. Up to 19 seabird species, plus antarctic fur seals *(Arctocephalus gazella)* were involved. Black-browed Albatross *(Diomedea melanophris),* Macaroni Penguins *(Eudyptes chrysolophus),* and prions *(Pachyptila* spp.) were the most abundant species. Most flocks were in the vicinity of a large inshore patch of antarctic krill *(Euphausia superba),* and most observed feeding was by Black-browed Albatross, which appeared to initiate and dominate the flocks. Short feeding bouts by surface-feeding species appeared to be coupled with the surfacing of penguins and seals. It is concluded that foraging penguins and seals caused prey to approach the surface where near-surface foraging species could feed. (Auth.)

B-45262

Makarov, R.R., Men'shenina, L.L., **On the distribution of euphausiid larvae in antarctic waters,** *Oceanology,* 1989 (Pub. Apr.90) 29(5), p.623-627, 24 refs. For Russian original see 18B-41737.

Based on original research and literature data reviewed, the larval distribution of 5 species of euphausiids is discussed. Three basic areas of distribution are identified: the Antarctic Circumpolar Current, waters originating at high latitudes, and shelf waters. (Auth. mod.)

B-45263

Briantsev, V.A., Bibik, V.A., **Movement of accumulations of antarctic krill *(Euphausia superba)* in the Commonwealth Sea region,** *Oceanology,* 1989 (Pub. Apr. 90) 29(5), p.628-629, 5 refs. For Russian original see 18B-41738.

Observations of the migrations of krill aggregations within the coastal zone of Commonwealth Bay, made during the 18th cruise of SRV *Fiolent* in Jan.-Mar. 1984, have shown that their average speed changed from 11 miles/day (during strengthening of southeasterly winds to 15-17 m/sec) to 2 miles/day (during wind weakening and changing to westerlies). The relationship between migrations of krill aggregations and wind drift was noted. Indications of normal migration of krill aggregations have not been found. (Auth.)

B-45304

Selkirk, P.M., Seppelt, R.D., Selkirk, D.R., **Subantarctic Macquarie Island: environment and biology,** Cambridge University Press, 1990, 285p., Refs. p.231-250.

DLC QH197.S37

This book, written by three biologists who have drawn on their own observations made during several summers' fieldwork on Macquarie I., as well as on published work of others, deals with the island's discovery and history of human occupation; the island's setting, origin, geology, geomorphology and Quaternary history; the island's vegetation, lakes, birds and mammals; microbiology, parasitology and terrestrial arthropods; the nearshore environment; and the human effects, including introduced animals and plants on the island, and conservation and management strategies.

B-45314

Hoshiai, T., **Distribution and development processes of sea-ice algal communities,** *Korean journal of polar research,* June 1991 2(1) (Special issue), Second International Symposium on Antarctic Science, Seoul, Korea, Sep. 17-18, 1990. [Proceedings], p.3-8, 25 refs.

Information on the distribution and developmental processes of ice algal communities in the Antarctic is reviewed. Although efforts were made in ecological research of ice algae, data acquired were insufficient to make realistic estimation of biomass and primary productivity of ice algae in the antarctic ocean. The need for synoptic observations on distribution and developmental processes of ice algal communities is pointed out.

B-45315

Kim, S.J., **Bacterial number, heterotrophy and extracellular enzyme activity in the Bransfield Strait, Antarctica,** *Korean journal of polar research,* June 1991 2(1) (Special issue), Second International Symposium on Antarctic Science, Seoul, Korea, Sep. 17-18, 1990. [Proceedings], p.9-16, 18 refs.

Sea water samples collected in the Bransfield Strait during the summer of 1989-1990 were analyzed for total bacterial number, total saprophytic bacterial number, heterotrophic activity and extracellular enzyme activity. Population density of saprophytic bacteria was significantly low, less than 0.0001 of the total bacterial number. Turnover times of glucose and leucine in sea water were in the ranges of 41 and 2094 hrs, and 56 and 980 hrs, respectively. Turnover times of these organic matters were extremely variable, depending on the sampling station and water depth. In the sediments, the enzyme activities of *alpha*-glucosidase, N-acetyl-beta-glucosaminidase and aminopeptidase of the fast-growing bacterial population were higher than those of the slow-growing bacterial population, but beta-glucosidase activities were higher in the slow-growing bacterial population. (Auth. mod.)

B-45316

Kim, D.Y., **Distribution and abundance of planktonic organisms in Bransfield Strait during austral summer 1989/90,** *Korean journal of polar research,* June 1991 2(1) (Special issue), Second International Symposium on Antarctic Science, Seoul, Korea, Sep. 17-18, 1990. [Proceedings], p.17-27, 16 refs.

To determine plankton distribution and abundance in Bransfield Strait, a total of 29 sampling stations was chosen in a systematic grid from Dec. 29, 1989 to Jan. 7, 1990. Phytoplankton was abundant in the northeastern sector of Bransfield Strait and the coastal areas of the Antarctic Peninsula, where water masses of the Weddell Sea might intrude. Diatoms were dominant (52 species out of 57 identified species) in most stations. *Chaetoceros socialis* and *C. neglectus* were dominant near the Antarctic Peninsula coast. In mid-Strait, the biomasses of phytoplankton were low and evenly distributed through the water column, while high biomasses were shown in the upper 50 m of the water column at coastal stations. A total of 39 taxa of zooplankton were identified from samples. Several species of copepoda were the most abundant (57.7%) followed by salpa (27.7%), chaetognatha (6.7%), and krill (1.3%). The macrozooplankton salpa *(Ihlea* sp. and *Salpa* sp.) predominated over the entire Bransfield Strait, occurring at 20 stations, and showed the highest biomass in the zooplankton community. The highest number of salpa was found in the northeastern sector of Bransfield Strait, the lowest near the Antarctic Peninsula coast. Fish larvae and krill were rarely found in the entire strait. (Auth. mod.)

B-45317

Kittel, W., Sicinski, J., **Population structure of krill *(Euphausia superba* Dana) near sea-ice zone between Elephant Island and South Orkney Islands (December 1988-January 1989),** *Korean journal of polar research,* June 1991 2(1) (Special issue), Second International Symposium on Antarctic Science, Seoul, Korea, Sep. 17-18, 1990. [Proceedings], p.29-35, 13 refs.

The effect of the sea-ice zone on the abundance, distribution and population structure of krill in three regions has been investigated: near Elephant I., near South Orkney Is. and in the region in between. Based on the analysis of the krill population structure, these three regions can be clearly distinguished. Mature krill were dominant in the Elephant I. and the South Orkney Is. regions. In the middle region, krill were smaller and juveniles dominated. Small but statistically significant differences in mean krill body length between the populations of the open ocean and of the pack ice were observed. (Auth.)

B-45318

Bacila, M., Rodrigues, E., Rosa, R., Lucchiari, P.H., **Developmental biology of antarctic birds in regard to the organic phosphate compounds of erythrocytes,** *Korean journal of polar research,* June 1991 2(1) (Special issue), Second International Symposium on Antarctic Science, Seoul, Korea, Sep. 17-18, 1990. [Proceedings], p.37-42, 12 refs.

A survey on the content of phosphorylated metabolic intermediates of erythrocytes from penguins and skuas at different stages of development was carried out. Embryos (25th and 30th day of incubation), chicks (2, 4, 14, 28-days old) and adult Adélie penguins *(Pygoscelis adeliae),* and 2-day old and adult skuas *(Catharacta mackormicki),* were the birds studied. Penguin eggs and chicks were obtained at the rookery of the Arctowski Station, and adult and chick skuas, from near the Commander Ferraz Station. (Auth.)

B-45339

Ray, M.K., Seshu Kumar, G., Shivaji, S., **Plasmids from the soil bacteria of Schirmacher Oasis, Antarctica,** *Microbios,* 1991 67(272-273), p.151-157, 16 refs.

Plasmids were detected in ten out of thirty-one bacterial isolates, belonging to the genera *Pseudomonas, Arthobacter, Flavobacterium, Planococcus* and *Micrococcus,* from the Schirmacher Oasis. The plasmids were either small (about 4 kb) or large (about 85 kb). Plasmid-curing experiments in isolates of *Flavobacterium* indicated that the plasmids contained antibiotic-resistant markers. DNA hybridisation studies and restriction analysis showed that the plasmids from the two isolates of *Flavobacterium multivorum* were identical. (Auth.)

B-45340

De Boer, J., Wester, P., **Chlorobiphenyls and organochlorine pesticides in various sub-antarctic organisms,** *Marine pollution bulletin,* Sep. 1991 22(9), p.441-447, 26 refs.

Brains, livers and muscles of two Gentoo penguins from the Falkland Is. and muscles of Argentinian hake, flying fish, and squid were analyzed for 24 individual chlorobiphenyl (CB) congeners and 15 other organochlorine compounds. In comparison with Atlantic hake caught south of Ireland, an enrichment of lower chlorinated biphenyls in the subantarctic organisms were found. The absolute values of the CBs and other organochlorine compounds were extremely low compared with the more polluted areas of the Northeast Atlantic. Compared with earlier reported DDE/PCB ratios in antarctic and subantarctic organisms, up to more than 10, DDE/PCB ratios clearly below 1 were found, which may suggest a rise of CB concentrations in the subantarctic region. The presence of trans-nonachlor, cis-chlordane and octachlorostyrene was confirmed by gas chromatographic-mass spectrometric analysis. (Auth.)

B-45343

Haderspeck, W., Hoffmann, K.H., **Thermal properties for digestive enzymes of a sub-antarctic beetle, *Hydromedion sparsutum* (Coleoptera, Perimylopidae) compared to those in two thermophilic insects,** *Comparative biochemistry and physiology,* 1991 100A(3), p.595-598, 16 refs.

Proteolytic, lipolytic, amylolytic and cellulolytic activities were studied in adults of the phytophagous beetle, *Hydromedion sparsutum,* indigenous to the subantarctic island of South Georgia. Gastric enzyme activities were measured at experimental temperatures of 5-40 C and results were compared with those obtained from two thermophilic insects, *Gryllus bimaculatus* and *Tenebrio molitor.* Protease and lipase activities in *Hydromedion* were 10-15 times lower than in *Gryllus* and *Tenebrio.* In the temperature range of 5-15 C, *alpha*-amylase activity from *Hydromedion* was only slightly lower than that from *Gryllus. Hydromedion* gut homogenates exhibited a distinct cellulolytic activity, even at a low temperature of 5 C. Cellulolytic activity in the digestive tract of *Hydromedion* was confirmed by the evolution of C-14O2 after consumption of labelled cellulose. The thermal properties of digestive enzymes agree well with the role of *Hydromedion* as primary decomposer in its ecosystem. (Auth.)

B-45344

Garrison, D.L., Buck, K.R., **Surface-layer sea ice assemblages in antarctic pack ice during the austral spring: environmental conditions, primary production and community structure,** *Marine ecology progress series,* Sep. 1991 75(2-3), p.161-172, 57 refs.

Favorable conditions for algal growth in sea ice develop during early spring as daylength and solar radiation increase. In the pack ice regions surrounding Antarctica, 'surface-layer' and 'internal' assemblages are the characteristic ice algal assemblages, whereas bottom-layer assemblages usually predominate in nearshore land-fast ice. Seasonal measurements of chlorophyll *a* have indicated little change in the algal biomass of internal assemblages, but very high concentrations (exceeding 400 microns Chl *a*/l) have been reported for surface layer assemblages in late summer. These observations suggest that most of the pack ice-associated production may depend on the formation and development of the surface-layer assemblages. The observed growth rates are sufficient to account for the development of surface-layer assemblages found in spring into the very high concentrations reported in late austral summer. Calculations of algal biomass accumulation based on available nutrients, however, indicated that net nutrient transport from water into the ice assemblage would be necessary to reach such high densities. A pattern of high algal biomass along the edge ice floes, with biomass decreasing toward the floe center, suggests nutrient transport, but the role of light entering ice floes from the side and producing this distribution cannot be ruled out. Estimates of ingestion and respiration by heterotrophic members of the ice biota suggest that grazing could affect community development and succession. (Auth. mod.)

B-45354

Joiris, C.R., **Spring distribution and ecological role of seabirds and marine mammals in the Weddell Sea, Antarctica,** *Polar biology,* Dec. 1991 11(7), p.415-424, 43 refs.

The early spring distribution of seabirds, pinnipeds and cetaceans was quantitatively determined in the northern Weddell Sea during the EPOS 1 cruise of the icebreaking RV *Polarstern.* Two hundred and ninety-one half hour counts were made in the Antarctic between Oct. 18 and Nov. 16, 1988 (+94 counts in subantarctic and subtropical water). The bird populations were dominated by the Adélie Penguin, which represented 90% of the birds counted in the closed pack ice (CPI), with a mean density of 31 penguins/sq km. Crabeater seal, the most common pinniped, had a mean density of 1.2/sq km in the CPI with local concentrations reaching 14/sq km. Expressed as biomass, mean values of about 90 kg/sq km were found in the whole antarctic zone for seabirds, 50 for seals, and 35 for baleen cetaceans. Densities were higher in the CPI: 140, 180 and 115 kg/sq km respectively, were found for birds, pinnipeds and baleen whales, and lowest in open water (8 kg/sq km for the birds, 0.2 for the pinnipeds and no whales). A minimum value of food intake by seabirds and marine mammals was estimated to be 2.7 mg C/sq m/d for the antarctic zone (4.1 in the CPI). A minimum krill production of 16 mg C/sq m/d is proposed for the antarctic zone: 22.5 in the CPI, 3 in open water, and intermediate values in the marginal ice zones. (Auth. mod.)

B-45355

Nicolaus, B., **Isolation of five strains of thermophilic eubacteria in Antarctica,** *Polar biology,* Dec. 1991 11(7), p.425-429, 21 refs.

Five isolates of thermophilic bacteria, capable of growing at 65 C, were obtained from samples of soil collected from the Cryptogam Ridge (Mount Melbourne) and in the area north of Edmonson Point, Northern Victoria Land. Electron microscopy, morphological and physiological properties, lipid analyses and GC content of the isolates are described in this paper. On the basis of the results presented, the organisms belong to the eubacterial domain. (Auth.)

B-45356

Poulet, S.A., Gill, C.W., **Appendage activity recordings of the subantarctic copepod *Drepanopus pectinatus* in relation to its feeding behaviour,** *Polar biology,* Dec. 1991 11(7), p.431-438, 31 refs.

Movements of the cephalic appendages of nauplii (stages 3 and 4), copepodites (stage 4) and adult female *Drepanopus pectinatus* were investigated using a computerized micro-impedance unit. The normal appendage movements recorded in filtered seawater were similar for adult females and copepodites. Traces for nauplii were different than those of the two other developmental stages. Appendage movements were modified when adult females were offered particles of different sizes and extracts of phytoplankton, showing significant changes in the frequency of the limb beats in relation to each stimulus. Impedance traces distinguished between activity of copepod appendages related to feeding and to swimming such as: flicking, stroking, jerking, combing, handling and rejecting particles. Prolonged recordings of restrained females in association with visual observations suggested that the activity of the mandibular palp was related to gut fullness and peristaltic movements, and to fecal pellet formation and evacuation. These results indicated that *D. pectinatus* is an intermittent beater responding to the physical and chemical characteristics of food. (Auth. mod.)

B-45357

Klein, B., Riaux-Gobin, C., **Algal pigment diversity in coastal sediments from Kerguelen (subantarctic Islands) reflecting local dominance of green algae, euglenoids and diatoms,** *Polar biology,* Dec. 1991 11(7), p.439-448, Refs. p.447-448.

High Performance Liquid Chromatography analysis of algal pigments from inter- and subtidal (deep and shallow) sediments from the Kerguelen Is. showed clear differences in the pigment composition at the different stations. High concentrations of chlorophyll *c* and fucoxanthin were present at all locations, indicating significant diatom densities. Chlorophyll *b* was detected at all sites. At one station, the other green algal pigments were also present. At another location, chlorophyll *b* was associated with a high concentration of diadinoxanthin, indicating an abundance of euglenoids and also that chemotaxonomy can be a powerful tool in microphytobenthos studies, since enumeration of living cells is difficult as many algae are attached to sediment particles. Ways of diagenesis, carotenoid degradation and the role of grazing are briefly mentioned. Phaeophorbide *a*-like pigments were the most significant chlorophyll *a* degradation products, with concentrations up to 110 micrograms/g dry weight sediment, i.e. 10 times the chlorophyll *a* concentration. Some taxonomic estimations, based on pigment ratios, and their limits, are discussed. (Auth. mod.)

B-45359

Ichii, T., Kato, H., **Food and daily food consumption of southern minke whales in the Antarctic,** *Polar biology,* Dec. 1991 11(7), p.479-487, Refs. p.486-487.

The stomach contents of 273 southern minke whales *(Balaenoptera acutorostrata)* were examined. The whales' dominant feeding ground coincided with a distinctive hydrographic front in the vicinity of the ice-edge at the mouth of Vincennes Bay. Krill *(Euphausia superba)* were the dominant food species, comprising 100% and 94% by weight of stomach contents in the ice-edge and offshore zones, respectively. In the offshore zone, minke whales tend to feed on *E. superba* rather than *Thysanoessa macrura.* Total food consumption by minke whales per day was estimated to be 1170 t and 596 t in the ice-edge and offshore zones, respectively. Feeding activity peaked in the early morning in the ice-edge zone. Two size modes of krill, 25-28 mm in body length (1 year-old) and 41-48 mm (3-4 year-old) dominated the diet. Although the former was numerically more abundant, the latter dominated the diet by weight, suggesting that larger krill are more important food for minke whales. The observed spatial pattern of krill populations in the study region suggests that movement of the subsurface cold water mass tended to carry krill offshore from the ice-edge. (Auth. mod.)

B-45360

Karlstam, B., **Crossed immunoelectrophoretic analysis of proteins from antarctic krill *(Euphausia superba)* with special reference to serine proteinases,** *Polar biology,* Dec. 1991 11(7), p.489-493, 24 refs.

Immunochemical characterization of proteins from krill *(E. superba)* and particularly serine proteinases was performed by crossed immunoelectrophoresis (CIE). A reference pattern with 34 arbitrarily numbered immunoprecipitates was established for a crude krill extract using IgG rabbit antiserum. A zymographic technique for detection of proteolytic activity was applied and revealed 4 casein-positive antigens. Introduction of different affinity media as intermediate gels in CIE demonstrated several proteins which strongly interacted with Sepharose-bound arginine and Con A. These results suggest the presence of trypsin-like enzymes and other serine proteases and a high content of glycoproteins with alfa-D-mannopyranoside and alfa-D-glycopyranoside residues. The CIE method thus offers a reliable and reproducible tool for identification and characterization of different krill enzymes as well as application in process control, when purifying individual proteins/enzymes. Moreover, this technology may serve as a fingerprinting method suitable for biological studies such as classification of geographical subpopulations, genotyping a specific species as well as making comparisons between different species. (Auth.)

B-45361

Bucht, A., Karlstam, B., **Isolation and immunological characterization of three highly purified serine proteinases from antarctic krill *(Euphausia superba)*,** *Polar biology,* Dec. 1991 11(7), p.495-500, 10 refs.

Three individual serine proteinases (I, II, III) originating from krill *(E. superba)* were separated and highly purified using a combination of affinity and high resolution ion exchange chromatography. A mixture of the three enzymes (I, II, III) revealed two immunoprecipitates, not one or three which should have been the case for identical or nonidentical immunological properties. Double immunodiffusion test according to Ouchterlony exhibited immunological identity between enzyme II and III. Enzyme I showed only partial identity with II/III. These findings correlated well with biochemical data on the three serine proteinases. Enzyme I is able to liberate free amino acids from polypeptides in comparison with enzyme II and III (classical true endopeptidases), which do not. It is suggested that these unique biochemical properties also have their immunological counterpart expressed as other antigenic determinants of the molecular structure. (Auth. mod.)

B-45362

Karlstam, B., Ljunglöf, A., **Purification and partial characterization of a novel hyaluronic acid-degrading enzyme from antarctic krill *(Euphausia superba)*,** *Polar biology,* Dec. 1991 11(7), p.501-507, 14 refs.

A novel enzyme-degrading hyaluronic acid has been isolated, purified and characterized from krill *(Euphausia superba).* A combination of affinity chromatography (Con A-Sepharose), gel filtration (Superose 6) and fast protein liquid chromatography (Mono Q) was used for the purification. The hyaluronidase activity was determined by a radial diffusion method based on hyaluronic acid incorporated into an agarose gel. After the final purification step on Mono Q column, the chromatogram showed three main peaks designated A, B and C. Peak C contained high hyaluronidase activity undetectable in peak A and B. The beta-glucuronidase activity was associated with peak A, while the endo-(1,3)-beta-D-glucanase activity was found in peak B and slightly in peak C. The hyaluronidase was purified about 85-fold. It had a pH optimum of 5.3, a temperature optimum of 37 C and a molecular weight of 80,000 Daltons. On polyacrylamide gradient gel electrophoresis the enzyme fraction showed one major band associated with hyaluronic acid decomposition, slightly contaminated with a few other components. Isoelectric focusing in combination with a hyaluronic acid zymogram demonstrated one major band at pH 6.7 with high enzyme activity. Preliminary data on enzyme specificity suggest that krill hyaluronidase is a new endo-beta-glucuronidase and support the concept of krill enzymes as a remarkable and unusually effective digestive system adapted to the antarctic marine ecosystem. (Auth. mod.)

B-45363

Harder, T.C., Plötz, J., Liess, B., **Antibodies against European phocine herpesvirus isolates detected in sera of antarctic seals,** *Polar biology,* Dec. 1991 11(7), p.509-512, 32 refs.

Neutralizing antibodies against European phocine herpesvirus were detected in sera of two antarctic seal species, Weddell seals *(Leptonychotes weddellii)* and crabeater seals *(Lobodon carcinophagus),* collected in the eastern Weddell Sea. A large number of positive sera crossneutralized canine herpesvirus, but only a few sera also contained antibodies to feline herpesvirus. The Weddell seals suffered from a respiratory disease when the sera were collected (Jan.-Feb., 1990). The significance and possible origin of herpesvirus infections in antarctic seals, documented for the first time in this communication, is discussed. All sera were negative for antibodies against phocine and canine distemper viruses. (Auth.)

B-45367

Miché, F., **Daily pattern of melatonin secretion in an antarctic bird, the Emperor Penguin, *Aptenodytes forsteri:* seasonal variations, effect of constant illumination and of administration of isoproterenol or propranolol,** *General and comparative endocrinology,* Nov. 1991 84(2), p.249-263, Refs. p.261-263.

Daily variations in circulating melatonin concentrations have been measured at monthly intervals from Apr. to Dec. 1986 in the Emperor Penguin, *Aptenodytes forsteri,* maintained under natural conditions. Both duration of the elevated nighttime melatonin levels and amplitude of the day-night rhythm display an annual variation closely related to variations in the daylength. Duration of the nocturnal peak of melatonin secretion depended upon the duration of the darkness, decreasing with increasing daylength and disappearing completely during the summer solstice. The duration of the nighttime melatonin peak increased inversely with decreasing daylength. The amplitude of the day-night rhythm decreased in such a way that the nocturnal peak of melatonin completely disappeared during the winter solstice. Three days of constant illumination in Sep. did not suppress the nighttime peak of melatonin secretion. The response of melatonin secretion, decreasing after beta-adrenergic agonist treatment and increasing after antagonist treatment, reinforces the hypothesis that in birds the regulation of melatonin synthesis differs from that of the rat. Receptors other than beta receptors may be involved. (Auth.)

B-45378
Rasmussen, P.C., **Relationships between coastal South American King and Blue-eyed Shags,** *Condor,* Nov. 1991 93(4), p.825-839, Refs. p.838-839.

Study skins from museums, Macquarie I., South Georgia and Antarctica, plus freshly collected King and Blue-eyed Shags from the South American continent and Falkland Is., were examined for evidence of hybridization. The distributions of King and Blue-eyed Shags *(Phalacrocorax albiventer* and *P. atriceps)* were reevaluated, incorporating new data. The differential distributions of the phenotypes do not correlate significantly with austral summer water temperatures. In areas where the forms occur together, hybridization is frequent and plumage-based disassortative mating occurs. At localities of overlap, King and Blue-eyed shags are virtually identical in skeletal size and shape. Heterozygosity is very similar for both forms over all populations. Genetic distances between the two forms are very low. King and Blue-eyed Shags should be considered conspecific color morphs of a single widespread species, *(P. atriceps.)* (Auth. mod.)

B-45386
Casanova, J.P., **First record of a benthic polar chaetognath: a new *Spadella* from the Antarctic,** *Journal of natural history,* Sep-Oct. 1991 25(5), p.1355-1362, 13 refs.

A new benthic chaetognath, *Spadella antarctica* n. sp., is described from depths between 193 and 500 m in the Weddell Sea and comparisons are made with related species of *Spadella.* Ecological remarks on this genus are provided. (Auth.)

B-45388
Karsten, U., Wiencke, C., Kirst, G.O., **Effect of salinity changes upon the physiology of eulittoral green macroalgae from Antarctica and southern Chile. II. Intracellular inorganic ions and organic compounds,** *Journal of experimental botany,* Dec. 1991 42(245), p.1533-1539, 37 refs.

The effects of hypo- and hypersaline treatments ranging from 7-68 per mill on the intracellular inorganic ion and organic solute concentrations were determined in the eulittoral green macroalgae *Ulothrix implexa, Ulothrix subflaccida, Enteromorpha bulbosa, Acrosiphonia arcta,* and *Ulva rigida* from Antarctica and southern Chile. The main inorganic cations and anions in all species and conditions for variations in content are noted. The organic solutes proline, sucrose, and *beta*-dimethylsulphoniopropionate (DMSP) played an important role in osmotic acclimation. The occurrence of three organic osmolytes suggests an additional function of these solutes as cryoprotectants in the cold-water macroalgae investigated. (Auth. mod.)

B-45389
Nichols, P.D., Skerratt, J.H., Davidson, A., Burton, H., McMeekin, T.A., **Lipids of cultured *Phaeocystis pouchetii:* signatures for food-web, biogeochemical and environmental studies in Antarctica and the southern ocean,** *Phytochemistry,* 1991 39(10), p.3209-3214, 45 refs.

The lipid, fatty acid, sterol and pigment composition of cultured *Phaeocystis pouchetii* were analyzed by capillary GC, GC-MS, TLC-FID and HPLC. Polar lipids were the dominant class. Significant variation occurred among strains in the amount of lipid per cell; lipid content varied from 3.5 pg/cell for the axenic spherical colony forming strain Al-3, to 8.2 pg/cell for the largely flagellate strain DE10 and 7.7 pg/cell for the benthic strain. The dominant sterol was 24-methylcholesta-5,22*E*-dien-3*beta*-ol irrespective of culture age or life stage composition. The major fatty acids for strain Al-3 were: 16:0, 18:1*omega*9c, 14:0 and 18:0, while profiles for strains DE10 and Al-4 contained 14:0, 16:0, 18:1*omega*9c and 18:0. The essential fatty acids 20:5*omega*3 and 22:6*omega*3 were only minor or trace components, demonstrating the poor nutritional quality (with respect to fatty acids) of *Phaeocystis* to antarctic grazers. However, the lipid and fatty acid content of the strains indicate that the flagellate stage is of greater nutritional value than the free floating colonies, and that the flagellate and benthic colonial stages are most biochemically alike. The major pigments in all strains were chlorophylls *a* and *c* and 19'-hexanoyloxyfucoxanthin. Minor carotenoids detected were 19'-butanoyloxyfucoxanthin, fucoxanthin, diadinoxanthin and diatoxanthin. Small variations were observed among cultures. (Auth. mod.)

B-45394
Cattaneo-Vietti, R., **Nudibranch molluscs from the Ross Sea, Antarctica,** *Journal of molluscan studies,* Nov. 1991 57(4) Supplement, p.223-228, 23 refs.

During the 2nd Italian Oceanographic Antarctic Expedition (1989-90) a small number of nudibranchs was collected at Terra Nova Bay. In addition to well known species (such as *Austrodoris kerguelensis* Bergh, 1884 and *Tritoniella belli* Eliot, 1907) other more unusual species were also recorded, including *Pseudotritonia gracilidens* Odhner, 1944 and *Cuthona georgiana* (Pfeffer, 1884). Comparative information on the principal diagnostic features of the numerous species of *Cuthona* from the subantarctic and antarctic waters is also tabulated and discussed. (Auth.)

B-45395
Wägele, H., Hain, S., **Description of a new notaspidean genus and species (Opisthobranchia: Notaspidea) from the antarctic ocean,** *Journal of molluscan studies,* Nov. 1991 57(4) Supplement, p.229-242, 22 refs.

A new genus and species of the suborder Pleurobranchoidea Férrussac, 1822 (order Notaspidea) is described from the Weddell Sea. It is the second species of side-gilled sea slug to be described from the southern polar seas. The monotypic genus *Tomthompsonia* new genus with the species *T. spiroconchalis* new species differs from all other known genera of the Pleurobranchoidea by its coiled internal shell, and the absence of a median buccal gland and pedal gland. The phylogenetic affinities within the Pleurobranchoidea are discussed. (Auth.)

B-45397
Rakusa-Suszczewski, S., **Respiration of *Orchomene plebs* (Hurley 1965) and *Waldeckia obesa* (Chevreux 1905) from Admiralty Bay (South Shetland Islands, Antarctica),** *Polskie archiwum hydrobiologii,* 1990 (Publ. May 91) 37(3), p.297-303, 14 refs. For another version see Hydrobiologiia 223:177-180, Oct. 4, 1991.

Metabolism of *O. plebs* from Admiralty Bay is higher than that of *W. obesa,* and similar to that of *O. plebs* from McMurdo Sound. The range of variation in respiration is highest below freezing, which means that these are optimum temperatures for the Amphipoda species under study. (Auth.)

B-45398
Rakusa-Suszczewski, S., **Seasonal changes in respiration and biomass of *Euphausia superba* Dana from Admiralty Bay (South Shetland Islands, Antarctica),** *Polskie archiwum hydrobiologii,* 1990 (Publ. May 91) 37(3), p.305-311, 16 refs.

Respiration of krill at the beginning of Oct. at -1.8 C is more than 40% lower than at the end of Nov. with the temperature at -1.0 C. The metabolic rate of an *E. superba* population in an annual cycle may change many times with the change in size distribution, biomass and water temperature. (Auth.)

B-45400
Coleman, C.O., **Comparative fore-gut morphology of antarctic Amphipoda (Crustacea) adapted to different food sources,** *Hydrobiologia,* Oct. 4, 1991 Vol.223, International Colloquium on Amphipoda, VIIth, South Bristol, ME, Sep. 1990, p.1-9, 31 refs.

The fore-gut morphology of ten species of antarctic amphipods utilizing different food sources was investigated. There are considerable differences in shape, relative lengths of the stomachs and their structures. Relative lengths of the stomachs range from more than 30% to 2% compared to the total body lengths. The relative length of the anterior rough filter corresponds in general with the relative stomach length. Stomachs with long rough filter share in general a small fine filter area. Interspecific differences of stomach lateralia might be used for phylogenetic analysis, but are apparently not related to different food sources. Different speculative selective pressures that might have influenced the evolution of fore-guts are discussed. (Auth.)

B-45401
Jazdzewski, K., Teodorczyk, W., Sicinski, J., Kontek, B., **Amphipod crustaceans as an important component of zoobenthos of the shallow antarctic sublittoral,** *Hydrobiologia,* Oct. 4, 1991 Vol.223, International Colloquium on Amphipoda, VIIth, South Bristol, ME, Sep. 1990, p.105-117, With French summary. Refs. p.115-117.

Benthic quantitative samples were taken in 1988 in the soft bottom sublittoral of Admiralty Bay, King George I. using a Tvärminne-type bottom sampler and SCUBA-diving technique at 7 successive stations situated at depths from 4 to 30 m. Dominant animal groups in terms of abundance were Amphipoda, Polychaeta and Bivalvia, whereas in terms of biomass Echinoidea were also dominant. Amphipod crustaceans clearly dominated the zoobenthos at depths from 10 to 25 m, the numerical share surpassing 60%, with maximal abundance of about 17,000 ind/sq m. In terms of biomass at specific depths, amphipods occupied the 1st, 2nd or 3rd place with maximal biomass of about 100 g/sq m where the maximal total biomass of zoobenthos reached 260 g/sq m (10 m). Amphipoda were the most diversified group with some 35 taxa belonging to 14 families. Most species belonged to Eusiridae s.l. and Lysianassidae s.l. Dominant forms were *Pontogeneiella brevicornis, Prostebbingia gracilis, Schraderia gracilis, Hippomedon kergueleni, Orchomenella cf. ultima, Cardenio paurodactylus* and *Paraphoxus rotundifrons.* (Auth.)

B-45402
Jacob, A., Kirst, G.O., Wiencke, C., Lehmann, H., **Physiological responses of the antarctic green alga *Prasiola crispa* ssp. *antarctica* to salinity stress,** *Journal of plant physiology,* Nov. 1991 139(1), p.57-62, Refs. p.61-62.

The thalloid green alga *Prasiola crispa* ssp. *antarctia* (Kützing) Knebel was subjected to salinity stress ranging from 0.35 per mill (freshwater conditions) up to 175 per mill (5-fold seawater). Hypoosmotic treatment did not affect growth rate, photosynthesis or dark respiration. Sorbitol and sucrose decreased following decreases in external salinity. Increases in salinity above 35 per mill (standard seawater) caused a reduction in growth rates, photosynthesis and dark respiration. The content of inorganic ions increased, exhibiting a maximum in 70 per mill medium, whilst the highest contents of organic osmolytes such as sucrose and sorbitol were measured in 175 per mill seawater. There was good recovery of physiological activity after returning the plants to normal seawater (35 per mill). This was indicated by restoration of normal growth rates, photosynthesis and dark respiration. The tolerance of *P. crispa* to a wide range of salinities is an important condition to its growth in the upper littoral of Antarctica. In this habitat the alga is frequently encountered with hypoosmotic milieus due to rain or meltwater. In contrast, hyperosmotic conditions may occur due to salt spray or desiccation. (Auth. mod.)

B-45405
Kunzmann, A., Caruso, C., Di Prisco, G., **Haematological studies on a high-antarctic fish: *Bathydraco marri* Norman,** *Journal of experimental marine biology and ecology,* Oct. 11, 1991 152(2), p.243-255, Refs. p.254-255.

The first record of the blood parameters of the antarctic fish *Bathydraco marri* is presented; the structural and functional characterization of haemoglobin purified from the blood of this species is reported. One single haemoglobin was detected and the globin chains were purified and subsequently sequenced. The molecular weights of the alpha- and beta-chains were 15,552 and 16,048, respectively. O2 binding was measured as a function of pH and a strong Root effect as well as a large negative alkaline Bohr effect were observed. The subunit cooperativity was lost at lower pH values. The plasma contribution to the total O2-carrying capacity was 16.7%. The pH was 7.7; the mean venous pressures of CO2 and O2 were 3.8 and 58.5 mm Hg, respectively. For comparison, a summary of the available data from other bathydraconids is presented. Special attention is given to the mode of life and the evolution of this teleost in relation to its habitat. (Auth. mod.)

B-45406
Delille, D., Perret, E., **Influence of giant kelp *Macrocystis pyrifera* on the growth of subantarctic marine bacteria,** *Journal of experimental marine biology and ecology,* Nov. 27, 1991 153(2), p.227-239, Refs. p.238-239.

The short-term effects of giant kelp *Macrocystis pyrifera* C.A. Agardh on the growth of subantarctic bacterial microflora were followed under various seasonal conditions in coastal seawater of the Kerguelen Archipelago. Artificial degradation experiments were carried out in 3 cu m tanks, where daily sampling allowed a regular survey of bacterial changes in the supplemented seawater. The results clearly revealed a significant response of the subantarctic bacterial community to macrophyte addition. Bacteria grew rapidly on freshly harvested or stranded kelp. Doubling time had a mean value of 40 h for total bacteria and 8 h for heterotrophic bacteria. Bacterial growth peaked within the first 3-5 days but declined thereafter. Both total and heterotrophic bacterial increases were higher in stranded or detritic kelp experiments than in freshly harvested kelp experiments. The amphipod *Parathemisto gaudichaudii* Guerin was used to assess the stimulating effect of macrofaunal breakdown on the bacterial decomposition of the kelp. (Auth.)

B-45409

Scientific Committee for the Conservation of Antarctic Marine Living Resources, **Selected scientific papers 1990,** Hobart, Tasmania, CCAMLR, 1991, 573p., In English, French, Russian and Spanish. Refs. passim. For individual papers see B-45410 through B-45435, J-45436, B-45437 through B-45442 and I-45443.

This document contains a selection of the scientific papers presented at meetings of the Scientific Committee and Working Groups of the Scientific Committee in 1990. The texts of the papers are reproduced in the original language of submission; abstracts of the papers and captions of tables and figures are translated into the official languages of the Commission (English, French, Russian and Spanish). (Auth.)

B-45410

Makarov, R.R., **Size compositions of males and females in the course of the life cycle of *Euphausia superba*,** Scientific Committee for the Conservation of Antarctic Marine Living Resources. Selected scientific papers 1990, Hobart, Tasmania, CCAMLR, 1991, p.3-16.

Earlier studies did not pay attention to differences in size composition of *Euphausia superba* populations by sex and its seasonal variability. In this paper variations in size and sex composition of samples from commercial catches are analyzed over the reproductive season, using samples from different years. The observed variations were related to stages of krill maturity during the reproductive cycle. Information on size composition by sex is considered to be vital for an understanding of krill population structure. It is suggested that duties of biologist-observers aboard commercial vessels should include not only measurement but also sex determination of adult krill. (Auth.)

B-45411

Ichii, T., **Homogeneity of body length composition of antarctic krill within the commercial zone,** Scientific Committee for the Conservation of Antarctic Marine Living Resources. Selected scientific papers 1990, Hobart, Tasmania, CCAMLR, 1991, p.17-28, 2 refs.

The homogeneity of krill *(Euphausia superba)* length composition in commercial trawl catches (hauls) was investigated by comparing length compositions from different parts of the same haul. There was no significant difference ($P>0.05$) in 53 out of 60 hauls. Therefore it is concluded that sampling from one part of the haul provides a reasonable estimate of length composition in the entire haul. In contrast to small variations in length composition within the same haul, variation between different hauls was most noticeable in areas where krill length frequency compositions were bimodal. (Auth.)

B-45412

Miller, D.G.M., **On the intensity of sampling krill trawl catches,** Scientific Committee for the Conservation of Antarctic Marine Living Resources. Selected scientific papers 1990, Hobart, Tasmania, CCAMLR, 1991, p.29-48, 8 refs.

This paper uses actual krill length-frequency data in an attempt to address the problem of the determination of adequate sample size to obtain representative krill length-frequency distributions from commercial catches. The possible effects of two other factors (within-trawl variability and sample decomposition), which may influence length-frequency data quality, is also considered. (Auth. mod.)

B-45413

Kasatkina, S.M., Latogurskiĭ, V.I., **Distribution characteristics of krill aggregations in the fishing ground off Coronation Island in the 1989/90 season,** Scientific Committee for the Conservation of Antarctic Marine Living Resources. Selected scientific papers 1990, Hobart, Tasmania, CCAMLR, 1991, p.49-73, 16 refs.

Distribution characteristics of krill aggregations in the Coronation I. fishing ground were examined in relation to environmental factors, the biological condition of krill and the performance of the fishery, from Oct. 1989 to Feb. 1990. All common types of krill aggregations were recorded in the Coronation I. area over the observation period. From Nov. to Feb. scattered forms of krill tended to combine into larger aggregations. Wind force had no direct or indirect influence on the types of krill aggregations or their density. The increased temperature towards the end of the season, however, assisted the development of phytoplankton which in turn led to an increase in krill concentration. The biological parameters of krill examined (stages of maturity, sex ratio and krill size) varied according to aggregation type. Distribution characteristics of krill aggregations varied significantly over time. It is therefore recommended that CPUE simulation studies take into account the actual distributional features of targeted aggregations and the catchability rates of the trawls used at different times in the life of the fishery. (Auth. mod.)

B-45414

Hampton, I., **Measurements of differences in the target strength of antarctic krill *(Euphausia superba)* swarms at 38 kHz and 120 kHz,** Scientific Committee for the Conservation of Antarctic Marine Living Resources. Selected scientific papers 1990, Hobart, Tasmania, CCAMLR, 1991, p.75-86, 8 refs.

Differences in the target strength of adult (36 to 60 mm) krill *(Euphausia superba)* at 38 and 120 kHz have been inferred from differences in the mean back-scattering strength of swarms simultaneously insonified at these two frequencies in studies off the South Orkneys and Elephant Is. in Mar. 1990. Back-scattering strengths at 120 kHz ran consistently about 7 dB higher than at 38 kHz, a difference which was regarded as too large to be explained by possible experimental error, and which was therefore attributed to real differences in average target strength at these two frequencies. The results are in good agreement with recent experimental work on the target strength of encaged *E. superba* at 38 and 120 kHz, but are in major conflict with the 120 kHz-to-50 kHz target strength conversion factor used at the Post-FIBEX Acoustic Workshop in 1984. (Auth.)

B-45415

Zimarev, IA.V., Kasatkina, S.M., Frolov, IU.P., **Midwater trawl catchability in relation to krill and possible ways of assessing gross catch,** Scientific Committee for the Conservation of Antarctic Marine Living Resources. Selected scientific papers 1990, Hobart, Tasmania, CCAMLR, 1991, p.87-113, 12 refs.

Research into midwater trawl catchability rates was carried out on the basis of data obtained from AtlantNIRO expeditions from 1983 to 1990 in the Scotia Sea. A methodology was developed for and applied to determining the rate of krill filtration through the trawl rope and netting and also the probability that krill will come into contact with various parts of the net as it passes through the trawl sides. Studies were based on the results of 250 hauls made with a 72/308 trawl. Catchability was worked out with the aid of fine-meshed chafers, hydroacoustic methods and theoretical calculations. A comparison of the experimental hydroacoustic assessment with the calculated one demonstrated that the theoretical model agreed well with the real situation. Analysis of the efficiency of midwater trawls in the krill fishery indicates that the potential exists for this efficiency to be increased. (Auth.)

B-45416

Fedotov, A.C., **Krill biomass assessment in statistical Area 48 from the RV *AtlantNIRO* data—autumn 1989/90,** Scientific Committee for the Conservation of Antarctic Marine Living Resources. Selected scientific papers 1990, Hobart, Tasmania, CCAMLR, 1991, p.115-121, 3 refs.

A krill biomass census survey was carried out at two fishing grounds in the South Sandwich and South Orkney Is. areas during a cruise by RV *AtlantNIRO* in Mar./Apr. 1990. The survey was conducted in the upper 100 m layer using a modified Isaacs-Kidd trawl. Trawling speed was 3.2 to 3.6 knots. The total krill stock on the poorly studied site off the South Sandwich Is. was assessed at 3.8 million tonnes, most of which was concentrated in the waters of the Weddell Sea. In contrast to this site, the one off the South Orkney Is. is well-established in terms of both research and commercial harvesting. The overall krill stock here was estimated to be 1.1 million tonnes. Most of this stock was concentrated in the southwestern part of the Coronation I. shelf. (Auth.)

B-45417

Latogurskiĭ, V.I., Makarov, R.R., Maklygin, L.G., **Distribution, biomass and characteristics of the *Euphausia superba* fishery around South Georgia (Subarea 48.3),** Scientific Committee for the Conservation of Antarctic Marine Living Resources. Selected scientific papers 1990, Hobart, Tasmania, CCAMLR, 1991, p.123-147, 23 refs.

Results of 9 surveys on krill distribution, conducted by Soviet scientists in the South Georgia area from 1974 to 1988, are summarized. It is found that the distribution of krill swarms corresponds largely with areas where currents turn into eddies. In these areas, aggregations of krill are observed most often to the east of the island and around 37W. When water dynamics are favorable for krill aggregations, its biomass around South Georgia is approximately 400-800 thousand tonnes. Unfavorable conditions correspond to a biomass of an order of magnitude less. Short-term fluctuations of krill biomass in the South Georgia area are extremely significant. Biomass may differ by as much as eight times in a month. It also usually decreases in spring, regardless of the type of water circulation. Annual differences in krill biomass are undoubtedly associated with the volume of krill brought here by waters of the Scotia Sea Secondary Front. (Auth. mod.)

B-45418

Dolzhenkov, V.N., Timonin, V.P., **Krill *(Euphausia superba* Dana) resources and distribution in the Wilkes Land area in the seasons 1986 to 1989,** Scientific Committee for the Conservation of Antarctic Marine Living Resources. Selected scientific papers 1990, Hobart, Tasmania, CCAMLR, 1991, p.149-162.

Results of krill resource surveys carried out along the Wilkes Land coast from 1986 to 1989 are presented. Two research vessels were simultaneously involved in the survey with one vessel conducting commercial krill fishing. The whole survey area, from the coast to approximately 64S between 130 and 150E, was subdivided into 3 subareas, including an area to the north of the edge of the continental slope. Each subarea is described in terms of the number of krill aggregations, regularity of their observations, krill density and total krill biomass. It is found that the above parameters are closely related to variability in oceanographic conditions and extent of the ice cover. If ice conditions are favorable, the subarea between 143 and 150E is the most suitable for krill fishery. The mean annual density of krill in the subarea was 1,475 tonnes/sq mile. The total biomass of krill in the Wilkes Land area was assessed as being about 1 million tonnes. (Auth. mod.)

B-45419

Bibik, V.A., IAkovlev, V.N., **Status of krill *(Euphausia superba* Dana) resources in CCAMLR Statistical Divisions 58.4.2 and 58.4.3 from 1988 to 1990. Results of acoustic surveys,** Scientific Committee for the Conservation of Antarctic Marine Living Resources. Selected scientific papers 1990, Hobart, Tasmania, CCAMLR, 1991, p.163-173.

Biological and ecological monitoring of krill resources in the central part of the Indian Ocean (CCAMLR Statistical Divisions 58.4.2 and 58.4.3), conducted from 1988 to 1990, is discussed. It is found that the increase in krill biomass observed in the area in 1990 is linked with the abundant 1986 and 1987 year-classes and with a diminished rate of migration of krill of these year-classes from the area in 1989/1990. (Auth. mod.)

B-45420

De la Mare, W.K., **Factors to consider in developing management measures for krill,** Scientific Committee for the Conservation of Antarctic Marine Living Resources. Selected scientific papers 1990, Hobart, Tasmania, CCAMLR, 1991, p.175-187, 16 refs.

A brief review of the objectives of CCAMLR is given along with an outline of steps for the evolution of management procedures for krill fisheries. Various possible elements of procedures such as reactive, predictive, and feedback management, modelling, indicator species, pulse fishing, and the use of open and closed areas and seasons are outlined. Some interim management measures are suggested which could be implemented while a more generally applicable management is being developed. (Auth.)

B-45421

Butterworth, D.S., **Towards an initial operational management procedure for the krill fishery in Subareas 48.1, 48.2 and 48.3,** Scientific Committee for the Conservation of Antarctic Marine Living Resources. Selected scientific papers 1990, Hobart, Tasmania, CCAMLR, 1991, p.189-219, 26 refs.

An operational management procedure for krill in Subareas 48.1, 48.2 and 48.3 requires a basis for the assessment of resource status, and an algorithm for specifying the levels of regulatory mechanisms (e.g., a catch control law) that depends on the results of the assessment. The development and selection of a procedure requires a basis for the simulation testing of procedures, and an operational definition of CCAMLR Article II to provide criteria against which to assess procedure performance. Suggestions are made under each of these headings. An operating model of krill dynamics in the region is developed for simulation testing purposes. A provisional operational interpretation of Article II is proposed: the primary objective is to prevent the expected lowest biomass of krill over a 20-year harvesting period from falling below 60% of its average unexploited level; subject to this constraint, accumulated catches should be as large as possible without substantial associated probability that TAC reductions may prove necessary during the 20-year period considered. Simulation tests, including one particular test of robustness to the assumptions of the operating model, are carried out to illustrate the overall process proposed. (Auth. mod.)

B-45422

Analysis of results from demersal fish surveys at South Georgia, undertaken by the United Kingdom and the USSR, January and February 1990, Scientific Committee for the Conservation of Antarctic Marine Living Resources. Selected scientific papers 1990, Hobart, Tasmania, CCAMLR, 1991, p.223-254, 1 ref.

This is a report of a joint UK/USSR workshop held July 23-27, 1990, which describes discussions and analyses of the data from a survey from MV *Hill Cove* in Jan. 1990, and RV *Akademik Knipovich* in Feb. 1990, around South Georgia. Both surveys were characterized by large numbers of small hauls interspersed with a few large catches. The small number of large catches cause a disproportionate increase in the estimated standing stock of *Champsocephalus gunnari.* The paper describes the ways in which these large hauls were considered in the analysis. No ideal method was found for incorporating the large hauls into the analysis. (Auth. mod.)

B-45423

Everson, I., Campbell, S., **Toothfish, *Dissostichus eleginoides,* at South Georgia,** Scientific Committee for the Conservation of Antarctic Marine Living Resources. Selected scientific papers 1990, Hobart, Tasmania, CCAMLR, 1991, p.255-261, 3 refs.

The *Dissostichus eleginoides* fishery at South Georgia has expanded greatly in recent years. It has been claimed that the exploited fish are senescent and not contributing to the breeding population (CCAMLR-VIII, paragraph 106). Histological examination of the gonads of a small sample of fish taken from a commercial longliner in Jan. 1990 indicates that the fish are sexually mature and, at the time of sampling, are approaching spawning condition. (Auth.)

B-45424

Barrera Oro, E., Marschoff, E., **Declining trend in the abundance of *Notothenia rossii marmorata* and *Notothenia gibberifrons* observed in fjords at two sites of the South Shetland Islands,** Scientific Committee for the Conservation of Antarctic Marine Living Resources. Selected scientific papers 1990, Hobart, Tasmania, CCAMLR, 1991, p.263-274, 10 refs.

A declining trend observed in the abundance of *Notothenia rossii marmorata* and *Notothenia gibberifrons* in fjords of the South Shetland Is. is analyzed by a nested ANOVA and demonstrated to be significant. The material for the current study was obtained with trammel nets at Potter Cove from 1983 to 1990, and in waters around Half-Moon I. in 1989. The analysis was based on the proportion of catches of the above mentioned species in relation to *Notothenia neglecta,* a species with similar ecological habits in the fjords. Since sampling by this method did not utilize a consistent amount of effort between years, the analysis made use of standardized catch data by expressing the catches of *N. rossii* and *N. gibberifrons* in proportion to the catches of *N. neglecta.* A similar declining trend had been reported in the 1960s and 1970s for neighboring sites on the South Shetland Is. This phenomenon might be explained as a consequence of the depletion of the stocks due to commercial exploitation in the area in the early 1980s. (Auth. mod.)

B-45425

Everson, I., Mitchell, C., **Fishery for *Patagonotothen brevicauda guntheri* in CCAMLR Subarea 48.3,** Scientific Committee for the Conservation of Antarctic Marine Living Resources. Selected scientific papers 1990, Hobart, Tasmania, CCAMLR, 1991, p.275-283, 3 refs.

Fine-scale data supplied to CCAMLR for 1987/88 showed that the catches of *Patagonotothen brevicauda guntheri* were five times greater in the South Georgia area than at Shag Rocks. Previous survey data and reports to the CCAMLR Working Group on Fish Stock Assessment indicated that this species has only been caught at Shag Rocks. Therefore the South Georgia catches were almost certainly of another species. The small size of *P. b. guntheri* means that they can only be caught with net meshes so small that they would also catch undersized individuals of other, larger species. Survey results suggest that such fishing is likely to have a significant effect on other species. *P. b. guntheri* has been reported as a by-catch of other fisheries; this suggests that illegal nets were used. (Auth.)

B-45426

Kochkin, P.N., **Age determination of *Champsocephalus gunnari* Lönnberg, 1905 (Channichthyidae) taken in the South Georgia area in 1990,** Scientific Committee for the Conservation of Antarctic Marine Living Resources. Selected scientific papers 1990, Hobart, Tasmania, CCAMLR, 1991, p.285-293, 13 refs.

In Jan.-Feb. 1990, the UK and the USSR conducted two research cruises on the RV *Hill Cove* and the RV *Akademik Knipovich* to study the status of the *Champsocephalus gunnari* stock in the South Georgia area. In Feb. the size composition of catches taken by *Akademik Knipovich* had three peaks corresponding to size groups of 16-18, 24-26 and 30-34 cm. Only vertebra samples (n=140) were used in age determination. Age groups from 1+ to 9+ were present in catches. Two peaks in size composition correspond with fish of the 1987 and 1985/86 year classes. The first small peak corresponds with the strong 1988 year class. (Auth.)

B-45427

Bidenko, V.G., Istomin, I.G., **Trawl bag selectivity in the *Champsocephalus gunnari* fishery,** Scientific Committee for the Conservation of Antarctic Marine Living Resources. Selected scientific papers 1990, Hobart, Tasmania, CCAMLR, 1991, p.295-312, 6 refs.

Experiments on trawl bag selectivity during fishing on pre-spawning concentrations of *Champsocephalus gunnari* were carried out in June 1990 in the South Georgia area concurrently with trawl surveys as part of the main biological and oceanic research program. The results presented here are based on 29 hauls and, due to the limited time available for experiments, should be considered as preliminary. L50% was 24.8 cm and the selectivity factor was 3.10 for a mesh size of 80 mm. Comparison of these results with results from previous years shows close similarity. A significant increase in modal length (up to 34-35 cm) as well as earlier sexual maturation of fish were noted. It is suggested that the use of Polish type chafers and a reinforced outer cover on trawl bags reduces the stress on the mesh threads and increases mesh openings, thus enhancing their selectivity properties. Further experiments are recommended in order to fully understand the mechanism involved. (Auth.)

B-45428

Frolkina, G.A., Dorovskikh, R.S., **On the instantaneous natural mortality rate of *Champsocephalus gunnari,* South Georgia (Subarea 48.3),** Scientific Committee for the Conservation of Antarctic Marine Living Resources. Selected scientific papers 1990, Hobart, Tasmania, CCAMLR, 1991, p.313-326, 6 refs.

The instantaneous rate of natural mortality (M) of *Champsocephalus gunnari* in the South Georgia area was assessed using six different methods. Data on size composition of catches from 1964/65 to 1968/69 and the age/length key for the first half of 1972 were used in the calculations. The results provided a wide range of estimates for M. The discussion of the results suggested that M=0.56 should be used in stock assessment for *C. gunnari* in Subarea 48.3. (Auth.)

B-45429

Gasiukov, P.S., **Standardization of fishing effort for *Champsocephalus gunnari* in the South Georgia area (Subarea 48.3),** Scientific Committee for the Conservation of Antarctic Marine Living Resources. Selected scientific papers 1990, Hobart, Tasmania, CCAMLR, 1991, p.327-336, 8 refs.

Traditional calculation of catch-per-unit-effort series is inflexible in its use of data types and has no estimate of accuracy. A standardized CPUE index for *Champsocephalus gunnari* fishing in Subarea 48.3 is derived using multiplicative model and data from many different classes (countries, types of vessel, fishing gear, months and years). Multiple regression is used to solve the model. The resultant yearly standardized CPUE shows the same trends independent of the values selected to standardize the model. The mean coefficient of variation for the CPUE values was 0.399. (Auth.)

B-45430

Kozlov, A.N., Shust, K.V., Zemskiĭ, A.V., **Seasonal and inter-annual variability in the distribution of *Electrona carlsbergi* in the southern Polar Front area (the area to the north of South Georgia is used as an example),** Scientific Committee for the Conservation of Antarctic Marine Living Resources. Selected scientific papers 1990, Hobart, Tasmania, CCAMLR, 1991, p.337-367.

Using 1987-1989 data from 6 trawl and acoustic surveys in the area north of South Georgia, seasonal and interannual variability in distribution, density and biomass of the most abundant species of myctophids, *Electrona carlsbergi,* are analyzed and summarized. Results show that the distribution and behavior of *E. carlsbergi* are strongly related to environmental conditions in the area as well as to the availability and distribution of zooplankton. *E. carlsbergi* was found over the entire study area. The largest concentrations, however, were found mainly along edges of the frontal zone where such fundamental environmental characteristics of water masses as currency dynamics, temperature and density attain the highest variation. The most large-scale and dense concentrations of *E. carlsbergi* were observed Dec. to Feb., when fish were distributed in the upper 50-100 m layer. The smallest and less dense concentrations were observed in June, at 200 m and deeper. The spring and autumn months were noted as transitional for parameters of vertical distribution and density of fish concentrations. Calculations of biomass of *E. carlsbergi* in the area indicate that its variability during the year is related to spatial and vertical distribution of fish. Interannual variability of *E. carlsbergi* biomass in the area was also observed. (Auth. mod.)

B-45431

Zemskiĭ, A.V., Zozulia, S.A., **Functional division of *Electrona carlsbergi* (Tåning, 1932) area of habitat in relation to the latitudinal zonation of the southern ocean,** Scientific Committee for the Conservation of Antarctic Marine Living Resources. Selected scientific papers 1990, Hobart, Tasmania, CCAMLR, 1991, p.369-395, 15 refs.

In Mar./Apr. of 1990 an integrated study survey was conducted in the southern Atlantic along two meridional transects, at 17 and 20W and c. 37 to 55S. The survey was focussed on studies of distribution of adult and pre-spawning *Electrona carlsbergi* and also on searching for possible spawning areas of the species. During the survey the following zones within the study area were identified as having different vertical structures of water masses: Subtropical Zone, Subtropical Frontal Zone, Subantarctic Zone, Polar Frontal Zone and antarctic Zone. Samples of *E. carlsbergi* were analyzed by length composition, sex ratio and maturity stages in relation to the location where samples had been taken. The following division of the *E. carlsbergi* area of habitat was suggested after the analysis: feeding area—Polar Frontal Zone; reproduction area—Subantarctic Zone and Subtropical Frontal Zone. The center of the species' area of habitat is in the Subantarctic Zone where the greatest range of fish length and stages of gonad maturity has been observed. (Auth. mod.)

B-45432

Mazhirina, G.P., **On reproduction of *Electrona carlsbergi* (Tåning),** Scientific Committee for the Conservation of Antarctic Marine Living Resources. Selected scientific papers 1990, Hobart, Tasmania, CCAMLR, 1991, p.397-409, 14 refs.

This paper presents results from histological examinations of gonads of *Electrona carlsbergi* from the Atlantic sector of the southern ocean. From materials available it has been ascertained that *E. carlsbergi* spawns in the notal waters. Maturation of females begins when body length reaches 76 to 78 mm. Vitellogenesis is asynchronous. Vitelline eggs have a diameter from 150 to 650 microns; in hydrated oocytes it is up to 900 microns. Maturation of ovaries is continuous, and spawning is serial. The spawning season is long and coincides with summer/autumn in the Southern Hemisphere. (Auth.)

B-45433

Gerasimova, O.V., **Feeding and food intake of *Electrona carlsbergi* (Tåning, 1932) myctophidae,** Scientific Committee for the Conservation of Antarctic Marine Living Resources. Selected scientific papers 1990, Hobart, Tasmania, CCAMLR, 1991, p.411-416, 12 refs.

Analysis of data collected in Feb.-Mar. 1989 in the area to the south of the Antarctic Convergence shows the following: in summer and autumn *Electrona carlsbergi* feeds mainly on copepods; daily food intake estimated by various methods is from 3.7 to 5.6% of fish body weight; the amount of food consumed by *E. carlsbergi* during the year is about 15 times fish body weight. (Auth. mod.)

B-45434

Filin, A.A., Gorchinskiĭ, K.V., Kiseleva, V.M., **Biomass of myctophids in the Atlantic sector of the southern ocean as estimated by acoustic surveys,** Scientific Committee for the Conservation of Antarctic Marine Living Resources. Selected scientific papers 1990, Hobart, Tasmania, CCAMLR, 1991, p.417-431, 2 refs.

Acoustic surveys carried out in the summer and autumn of 1987-1989 estimated the biomass of myctophids in the Atlantic sector of the southern ocean, between 48 and 56S and 8 to 48W, to be approximately 1.7 million tonnes. Over the greater part of the surveyed area the fish were sparsely distributed. Dense concentrations consisting predominantly of one myctophid species, *Electrona carlsbergi,* were found only in some limited areas. The bulk of the surveyed biomass of myctophids was found to be within the Antarctic Convergence area. (Auth.)

B-45435

Sabourenkov, E.N., **Mesopelagic fish of the southern ocean —summary results of recent Soviet studies,** Scientific Committee for the Conservation of Antarctic Marine Living Resources. Selected scientific papers 1990, Hobart, Tasmania, CCAMLR, 1991, p.433-457, 39 refs.

Since 1963, Soviet research on antarctic mesopelagic fish has been carried out as a part of the general multi-disciplinary program of research on antarctic biological resources. Studies concentrate primarily on the following four most abundant species: *Electrona carlsbergi, Electrona antarctica, Krefftichthys (Protomyctophum) anderssoni* and *Gymnoscopelus nicholsi.* Some data are available on their feeding, reproduction and age/length composition. The paper summarizes recently published results of these studies. A general description of mesopelagic myctophids is followed by more detailed information on individual species. Some details of the biological characteristics of these species are summarized in tables with details on area, season and source of data. Some data, e.g. length composition of samples, are also illustrated in figures. (Auth. mod.)

B-45437

De la Mare, W.K., Constable, A., **Refinements to the strategy for managing depleted fish stocks based on CCAMLR objectives,** Scientific Committee for the Conservation of Antarctic Marine Living Resources. Selected scientific papers 1990, Hobart, Tasmania, CCAMLR, 1991, p.467-475.

A method of calculating fishing mortalities is illustrated which will allow depleted fish stocks to recover to levels near those giving greatest net annual increment within two to three decades. These fishing mortalities are based on probabilistic descriptions of the future states of a depleted stock, and take into account uncertainty in assessments. Sample calculations show that applying a policy of F(0.1) will not always lead to stock recovery in two to three decades, and hence that additional management policies are required for depleted stocks. The implications of these studies for defining the terms 'depleted' and 'target levels for recovery' are briefly discussed. (Auth.)

B-45438

Croxall, J.P., Williams, T.D., **Gentoo penguin as a candidate species for the CCAMLR Ecosystem Monitoring Program,** Scientific Committee for the Conservation of Antarctic Marine Living Resources. Selected scientific papers 1990, Hobart, Tasmania, CCAMLR, 1991, p.483-488, 26 refs.

Based on dietary and other biological information collected over several years at Bird I. and at the South Shetland Is. (both within Integrated Study Regions (ISRs) of the CCAMLR Ecosystem Monitoring Program), it is suggested (from a full bibliography of supporting literature) that the gentoo penguin meets the specified criteria qualifying species for inclusion in the CEMP. The extensive dependence of this species in these ISRs on *Euphausia superba,* (including in winter), its residence in the ISRs in winter and its early attainment of sexual maturity are all features of special relevance to the CEMP. (Auth.)

B-45439

Croxall, J.P., Ricketts, C., Wood, A.G., **Food consumption by predators in a CCAMLR Integrated Study Region,** Scientific Committee for the Conservation of Antarctic Marine Living Resources. Selected scientific papers 1990, Hobart, Tasmania, CCAMLR, 1991, p.489-519, 6 refs.

A detailed description of the structure and mode of operation of a model for estimating food consumption of seabird predators is provided. This model is a development of earlier ones used in the South Georgia Integrated Study Region and incorporates new features, allowing for seasonal variation in predator weight (and hence energy requirements), diet composition, and prey energy content. Specimen outputs are provided, illustrating the changes produced by using these new sub-models. Results of initial sensitivity analyses indicate particular sensitivity to estimation of metabolic energy requirements. The system is directly applicable also to fur seals and could be modified to incorporate phocid seal data when available. Prey categories are readily modifiable to subdivide krill into sexes and maturity stages. With existing empirical data on breeding population size, diet, activity-specific energy requirements and foraging ranges, it is possible to make realistic estimates of krill consumption by penguins and fur seals during their breeding seasons within specified areas. (Auth.)

B-45440

Vagin, A.V., Popov, V.V., **Observation of seabirds in the southern ocean in 1988/89,** Scientific Committee for the Conservation of Antarctic Marine Living Resources. Selected scientific papers 1990, Hobart, Tasmania, CCAMLR, 1991, p.521-542.

This paper examines the numerical and species distribution of birds in the subantarctic area of the southern ocean to the south of 60S. Thirty minute observations were made daily during daylight hours at 8:00; 12:00, 16:00 and 20:00 ship-time, while sailing between antarctic stations and while en route to ports of call. Maps summarize the distribution of 14 bird species, including the individual species antarctic, snow, and cape petrels and the southern fulmar. Ice distribution patterns prevailing over the study period are discussed as is the wide variability of numerical and species distribution in each oceanic sector of Antarctica. (Auth.)

B-45441

Scolaro, J.A., Stanganelli, Z.B., Gallelli, H., Vergani, D.F., **Sexing of adult Adélie penguins by discriminant analysis of morphometric measurements,** Scientific Committee for the Conservation of Antarctic Marine Living Resources. Selected scientific papers 1990, Hobart, Tasmania, CCAMLR, 1991, p.543-549, 12 refs.

Discriminant analysis of 8 morphometric measurements was used to determine the sex of Adélie penguins. A sample of 46 adult birds was taken for measurement from the breeding population at Stranger Point, King George I. The sex of each bird had been determined earlier by means of observing the birds' breeding behavior (first incubation shift). It was found that the combination of flipper breadth, bill depth and length of the middle toe gave the most accurate sex discrimination (87% correct). Using measurements of flipper breadth and bill depth only also gave good results (80% correct). (Auth.)

B-45442

Marschoff, E., Gonzalez, B., **Optimization of survey sampling design in the detection of interannual variability and prey size selectivity in the diet of penguins,** Scientific Committee for the Conservation of Antarctic Marine Living Resources. Selected scientific papers 1990, Hobart, Tasmania, CCAMLR, 1991, p.551-559, 2 refs.

Based on the preliminary results of a survey of prey size in Adélie penguins, sampling designs intended for the detection of interannual variations in mean prey size and penguin size-related selectivity were analyzed in order to find the optimal allocation of observations at each level in nested ANOVA designs. The optimal numbers of penguins and krill to be used in the detection of interannual variability in the parameters concerned are recommended and a required sampling protocol is suggested. A table of minimal numbers of penguins to be sampled as a function of number of sampling dates and magnitude of the variance component is given, under the assumptions of balanced design and the variance component of "penguin-by-date" interaction equal to the variance component of "penguin-within-dates" obtained from a previous study. (Auth. mod.)

B-45448

Kellermann, A., **Egg and larval drift of the antarctic fish *Notothenia coriiceps*,** *Cybium,* Sep. 30, 1991 15(3), p.199-210, Refs. p.208-210.

The drift of eggs and larvae of the fish *Notothenia coriiceps* is described from material collected between 1975 and 1988. Spawning is probably demersal. The fertilized eggs ascend to surface waters and are pelagic until hatching. They drift into oceanic waters where they hatch in late Nov./early Dec. (Antarctic Peninsula). The larvae are neustonic and drift with the Antarctic Circumpolar Current. They are dispersed across the Scotia Sea and may drift as far as South Georgia, providing evidence of gene flow to other fish populations. The pelagic 'blue phase' juveniles may spend the winter and second summer in the midwaters before transition to the demersal phase, although this transition may occur by the end of the first summer. The complete lack of larvae during summer and fall suggests that the egg and larval population is dispersed from Bransfield Strait and adjacent waters. Recruitment to this area is likely to be provided from the southwest with the Circumpolar Current. The life cycle of *N. coriiceps* is compared with other nototheniid fishes showing similar early life history characters. The adaptive significance for antarctic fishes to produce large pelagic eggs is discussed. (Auth.)

B-45485

Davies-Coleman, M.T., Faulkner, D.J., **New diterpenoic acid glycerides from the antarctic nudibranch *Austrodoris kerguelensis*,** *Tetrahedron,* Dec. 2, 1991 47(47), p.9743-9750, 10 refs.

A single specimen of the antarctic nudibranch Austrodoris kerguelensis contained two major glyceride esters, 2'- acetoxyglyceryl (5R,10R,13R)-labda-8-en-15-oate(1) and 3'- acetoxyglyceryl (5R,10R,13R)-labda-8-en-15-oate(4), the diketones 6 and 7 that arise from oxidation of the 8,9-olefinic bond, and glyceryl (5R,10R,13R)-7-ketolabda-8-en-15-oate(8). The probable source of these metabolites is discussed. (Auth.)

B-45486

Radtke, R.L., Hourigan, T.E., **Age and growth of the antarctic fish *Nototheniops nudifrons*,** *U.S. National Marine Fisheries Service. Fishery bulletin,* 1990 88(3), P.557-571, 45 refs.

Sagittal otoliths of the antarctic fish Nototheniops nudifrons (Family Nototheniidae) contain internal microincrements which are visible by scanning electron microscopy. Microincrements were deposited on a daily basis, as validated through tetracycline and acetazolamide marking experiments. This was the first validation of daily microincrement deposition for any antarctic fish. Daily formation of microincrements continued throughout the year, including during the winter when daylight periods were short. Counts of daily microincrements in the otoliths of 32 juveniles and adults allowed the determination of age and growth rates. From this sample, a multivariate regression model relating fish age to otolith morphometrics and fish size demonstrated that age could be estimated reliably from sagittal otolith weight and length. Age was estimated for a large sample of N. nudifrons, which allowed the determination of growth and natural mortality. Fish grew slowly (15 mm per year), reaching sexual maturity at an age of 4-5 years, with the largest fish attaining ages of more than 8 years. Growth and survivorship were similar for males and females. (Auth.)

B-45539

Boysen-Ennen, E., Hagen, W., Hubold, G., Piatkowski, U., **Zooplankton biomass in the ice-covered Weddell Sea, Antarctica,** *Marine biology,* Nov. 1991 111(2), p.227-235, 35 refs.

Zooplankton was sampled by a Rectangular Midwater Trawl (RMT 1+8) in Weddell Sea surface waters (0-300 m) between 66 and 78S during Feb.-Mar. 1983. Sixty-nine taxa including different developmental stages were considered and divided into 16 size classes between <1 and >39.5 mm length. Biomass was determined by taxon and size class for three different meso- and macroplankton communities in the oceanic region, on the northeastern shelf and on the southern shelf of the Weddell Sea. Biomass in the northeastern shelf community was concentrated in the size ranges 1 to 4 mm and 19.5 to 39.5 mm. The oceanic community of the central Weddell Sea was dominated by copepods smaller than 5 mm, which made up half of the total oceanic biomass. Lowest biomass values were found in the southern shelf community concentrated in the 1 to 4 mm and 14.5 to 34.5 mm size classes. The data reveal that it is essential to distinguish among subsystems in the southern ocean. This leads to a better understanding of the structure and function of those pelagic food webs which represent alternatives to the paradigmatic krill-centered system. (Auth. mod.)

B-45540

Gutt, J., **Investigations on brood protection in *Psolus dubiosus* (Echinodermata: Holothuroidea) from Antarctica in spring and autumn,** *Marine biology,* Nov. 1991 111(2), p.281-286, 51 refs.

Brood protection in the holothurian *Psolus dubiosus* Ludwig and Heding, 1935 was investigated in the antarctic zone of permanent pack ice, an environment with an extreme seasonality in planktonic activity. Yearly reproductive cycles on the continental shelf of this area have been poorly investigated. Brooded juveniles of this species were found for the first time between the retracted tentacles of adult females at two different localities in the southeastern Weddell Sea. Mean lengths of the juveniles of each brooding female showed significant differences within each sample. However, there was no detectable difference in size of the juveniles between the two seasons. The results are discussed as an uncoupling of the dynamics of the early life history of these benthic invertebrates in space and time from processes in the euphotic layer of the southern ocean. The species investigated follows the general trend of some antarctic invertebrates towards a non-pelagic development. (Auth.)

B-45555

Braham, H.W., **Scientific investigations of the National Marine Mammal Laboratory, 1990,** *Polar record,* Jan. 1992 28(164), p.43-46, 21 refs.

This is the third in a series of articles summarizing research at the National Marine Mammal Laboratory under a 5-year plan initiated in 1988. In the section concerning Antarctica, it is reported that field research was carried out on Seal I. from Dec. 14, 1989 to Feb. 27, 1990. The main focus of study was the ecology and population biology of antarctic fur seals *Arctocephalus gazella* and chinstrap *Pygoscelis antarctica* and macaroni *Eudyptes chrysolophus* penguins. Analysis of stomach and fecal contents of live adult and sub-adult animals showed that krill were predominant in the diets of all three species, especially the penguins.

B-45557

Croxall, J.P., Everson, I., Miller, D.G.M., **Management of the antarctic krill fishery,** *Polar record,* Jan. 1992 28(164), p.64-66, 6 refs.

In response to a highly critical review of CCAMLR concerning the management procedures for krill, an alternative view is presented with intent to better define the nature and operation of CCAMLR. The scope and aims of CCAMLR are described; the progress towards management procedures and principles, and the present situation and future prospects, are discussed.

B-45570

Young, E.C., **Critical ecosystems and nature conservation in Antarctica,** Antarctica and global climatic change, edited by C.M. Harris and B. Stonehouse, London, Boca Raton, FL, Bellhaven Press, Lewis Publishers, 1991, p.117-146, 72 refs.

It is becoming clear that global temperature changes will occur more slowly, and the temperature rises will be less, than was originally thought. In view of this perception, the immediate and medium-term threats to antarctic ecosystems remain those currently identified, namely the impacts of disturbance, exploitation and pollution. There is little point, therefore, in worrying about the effects of possible temperature change in the distant future unless effective conservation is practiced now. Without conservation there may be few natural ecosystems left on which temperature change may act. This paper describes antarctic ecosystems, cataloguing current impacts from local and global agents and ways in which these are being mitigated by changing conservation awareness and practice. It then considers the additional possible impact of global climatic change. The discussion focuses almost entirely on temperature change, and its possible indirect effects on wind pattern and strength, on ocean circulation and on precipitation. It is an intriguing natural experiment as seasonal and daily photoperiodism, the other important components of seasonality and productivity, will remain constant. (Auth. mod.)

B-45571
Stonehouse, B., **Polar ecosystems, management, and climate modelling,** Antarctica and global climatic change, edited by C.M. Harris and B. Stonehouse, London, Boca Raton, FL, Bellhaven Press, Lewis Publishers, 1991, p.147-154, 8 refs.

Polar ecologists cannot generally help climatic modellers using data from the study of current ecosystems. Despite their relative simplicity, polar ecosystems are both complex and variable enough to be puzzling. They demonstrate substantial secular changes, but often the cause is not known. Neither polar plants nor animals give evidence of temperature sensitivity: factors limiting their distribution are just as likely to be aridity, or limitations imposed by ahumic soils. They should not, therefore, be sensitive indicators of small, long-term temperature changes of the kind envisaged by climatologists. Emissions of gases from tundra soils, and historic hunting records, are two more likely sources of ecological information of use to modellers. (Auth. mod.)

B-45579
Burton, H.R., McMeekin, T.A., Nichols, P.D., Hirsch, P., **Ecology and molecular biology of antarctic microorganisms (EMBAM),** 1991-1992 Australian Antarctic Research Program. Antarctic Treaty exchange information: Supplement A to particulars for ANARE, Kingston, Tasmania, 1991, p.95-98, 9 refs.

A project is proposed to discover the distribution and abundance of 24 groups of bacteria at selected depths in the water columns of a number of marine and saline lake sites throughout the year, and to sample and culture microorganisms from all the habitats in the Ekho Lake environment (including sediment, ice and a range of water depths). The aim is to make as near a total inventory of lake microorganisms as possible, using an extremely diverse range of microbiological techniques. The project will also collect lipid samples from the water column with a sea-star sampler, and reference these to microorganisms identified from the same depths.

B-45580
Burton, H.R., **Southern elephant seal foraging in the southern ocean,** 1991-1992 Australian Antarctic Research Program. Antarctic Treaty exchange information: Supplement A to particulars for ANARE, Kingston, Tasmania, 1991, p.103-107, 7 refs.

A project is proposed to determine the foraging areas of southern elephant seals from Heard I. by using time-depth- position recorders and satellite transmitters; to examine the diving performance of southern elephant seals from Heard I. and to compare this with data already obtained from seals at Macquarie I., using attached time-depth-position recorders; to census the southern elephant seal population on Heard I. during the pupping season (Oct.) to determine the trend in population size; to tag and to search for tags on southern elephant seals at Heard I. to obtain data on migration between Heard I. and other localities; to weigh over 300 pups of each sex at birth and at weaning to determine the maternal investment at Heard I.; to determine, by stomach lavaging, the diet of young animals (up to two years old) that haul out on Heard I. throughout the year and of adults that have been anaesthetized for retrieval of time- depth recorders. This will lead to a better understanding of the feeding ecology of elephant seals.

B-45581
Greenslade, P.J.M., Farrow, R.A., **Insect migration and monitoring studies on Macquarie Island,** 1991-1992 Australian Antarctic Research Program. Antarctic Treaty exchange information: Supplement A to particulars for ANARE, Kingston, Tasmania, 1991, p.121-124, 12 refs.

A project is proposed to monitor wind-transported insects on Macquarie I. to establish which species can disperse long distances on wind in the subantarctic and from where they originate, in order to predict what successful new introductions could occur and increase understanding of long-distance dispersal by insects; synchronously with the wind-trapping, to trap ground invertebrates on long-term monitoring sites set up in 1990-91 (which are being used by tourist and other groups) to document any changes that might be taking place; and to study community interactions and life history of some invertebrates during summer.

B-45582
Hosie, G.W., **Continuous plankton recorder survey of the Prydz Bay region,** 1991-1992 Australian Antarctic Research Program. Antarctic Treaty exchange information: Supplement A to particulars for ANARE, Kingston, Tasmania, 1991, p.125-129, 4 refs.

A project is proposed to assess the abundance of krill larvae produced in Prydz Bay each year, and thus determine regional, seasonal, annual and long-term variability; to determine the variability in development, growth and survival of the larvae; and to assess the variability in zooplankton abundance and species composition.

B-45583
Marchant, H.J., Wright, S.W., **Species composition, distribution and abundance of antarctic marine protists,** 1991-1992 Australian Antarctic Research Program. Antarctic Treaty exchange information: Supplement A to particulars for ANARE, Kingston, Tasmania, 1991, p.140-143, 12 refs.

A project is proposed to investigate the species composition, distribution and abundance of phytoplankton and protozoa in relation to the structure and dynamics of antarctic water masses; to investigate aspects of the biology of selected species of antarctic protists; and to investigate the protistan component of the diet of krill and other grazers.

B-45584
McMinn, A., Virtue, P., Nichols, P.D., Nicol, S., **Use of lipid profiles of *Euphausia superba* as a parameter for determining dietary preferences, and the abundance and spatial distribution of krill,** 1991-1992 Australian Antarctic Research Program. Antarctic Treaty exchange information: Supplement A to particulars for ANARE, Kingston, Tasmania, 1991, p.152-155, 7 refs.

A project is proposed to investigate the lipid class and composition of *Phaeocystis* sp. and other phytoplankton in terms of nutritional value to *Euphausia superba;* to relate lipid profiles of krill reared in the laboratory to that of their food source in order to develop species-specific signatures to be used in the field as an additional parameter in the estimation of the abundance and spatial distribution of krill; to ascertain the feeding preferences of *E. superba* and to monitor behavioral responses to their food supply in the laboratory; and to investigate lipid profiles of field patches of krill and to correlate them with lipid profiles of phytoplankton upon which they are feeding.

B-45585

McMinn, A., Feast, M.M., Melrose, W.D., **To establish the baseline parameters for the haematology and red blood cell metabolism of the southern elephant seal *(Mirounga leonina)*,** 1991-1992 Australian Antarctic Research Program. Antarctic Treaty exchange information: Supplement A to particulars for ANARE, Kingston, Tasmania, 1991, p.155-158, 3 refs.

A project is proposed to study the normal haematology of the southern elephant seal, using modern automated haematology analyses; to study red blood cell metabolism by measuring red-cell enzymes, metabolic intermediates, cation fluxes, and carbohydrate metabolism; and to study the normal karyotype variations in the southern elephant seal populations by collecting and freezing blood for karyotype and DNA analysis at a later date. Plasma and serum samples will be stored for possible biochemical and other analysis.

B-45586

Mock, D.W., St. Clair, C.C., **Brood reduction in royal and rockhopper penguins on Macquarie Island,** 1991-1992 Australian Antarctic Research Program. Antarctic Treaty exchange information: Supplement A to particulars for ANARE, Kingston, Tasmania, 1991, p.158-162, 30 refs.

A study of obligate brood reduction in royal *(Eudyptes schlegeli)* and rockhopper *(E. chrysocome)* penguins is proposed. The general goal is to improve understanding of the unique reproductive features of this genus and thereby enhance interpretations of brood-reduction phenomena in other avian taxa. The specific objectives are: quantitative description of egg-size dimorphism, laying and hatching asynchrony, egg and chick mortality, incubation and chick-rearing behavior; possibly paternity by DNA fingerprinting; experimentation:egg and chick exchanges to test explicit predictions of the insurance hypotheses; correlation (between species and sites on Macquarie I.) of ecological and life-history traits associated with brood reduction; and inter-specific comparison of proximate brood-reduction mechanisms and inferred selective pressures among the six circumpolar *Eudyptes* species.

B-45587

Moritz, C., Slade, R., McCallum, H., **Molecular population genetics of the southern elephant seal, *Mirounga leonina*,** 1991-1992 Australian Antarctic Research Program. Antarctic Treaty exchange information: Supplement A to particulars for ANARE, Kingston, Tasmania, 1991, p.163-166, 23 refs.

A project is proposed to use maternally and biparentally inherited DNA markers to describe on a fine scale the genetic structure of the Macquarie I. elephant seal population and, on a broader scale, to compare the three main breeding populations: those from the South Pacific, South Indian, and South Atlantic Oceans; and to assay the amount of genetic variation in genes of the major histocompatibility complex in the southern elephant seal.

B-45588

Ovenden, J.R., **Stock assessment of krill, using mitochondrial DNA analysis,** 1991-1992 Australian Antarctic Research Program. Antarctic Treaty exchange information: Supplement A to particulars for ANARE, Kingston, Tasmania, 1991, p.176-179, 6 refs.

The aim of this project is to continue the molecular genetic determination of the circumpolar stock structure of antarctic krill, *Euphausia superba.* Part of the nucleotide sequence of krill DNA was characterized in 1990 during a previous ASAC-funded project, and variation in the sequence among individuals from either side of the antarctic continent is currently being measured. This project will apply the same technique to krill collected from precise locations around the antarctic continent, to test hypotheses about the gross genetic structure of the species. The ultimate goal is to define genetically discrete sets of krill specimens from the nucleotide sequence data and to determine their biological relevance to wild krill stocks.

B-45589

Robertson, G.G., **Feeding ecology of penguins at Heard Island with special emphasis on king penguins,** 1991-1992 Australian Antarctic Research Program. Antarctic Treaty exchange information: Supplement A to particulars for ANARE, Kingston, Tasmania, 1991, p.181-184, 7 refs.

A project is proposed to collect data on the diet of king and gentoo penguins at Heard I. over a full twelve-month period, and of macaroni and rockhopper penguins over consecutive summers; to collect data on the annual energy and food requirements of breeding king penguins at Heard I.; to determine the energy and food requirements of king penguin chicks up to fledging; to determine the horizontal and vertical foraging areas of king, gentoo, macaroni and rockhopper penguins by time-depth- position recorders; and to census the breeding population of king penguins on Heard I. from photographs of colonies and from direct counts of smaller colonies and to establish reference breeding colonies of gentoo penguins.

B-45590

Robertson, G.G., **Population estimates of emperor penguins, Mawson Coast, Antarctica,** 1991-1992 Australian Antarctic Research Program. Antarctic Treaty exchange information: Supplement A to particulars for ANARE, Kingston, Tasmania, 1991, p.184-187.

A project is proposed to estimate annually the size of the breeding populations and the breeding success of emperor penguins at the Taylor Glacier and Fold I. emperor penguin colonies, and to estimate annually the number of fledglings produced at the Auster emperor penguin colony.

B-45591

Waas, J.R., Caulfield, M., Boag, P.T., Colgan, P.W., **Experimental study of reproductive synchrony in royal penguin colonies,** 1991-1992 Australian Antarctic Research Program. Antarctic Treaty exchange information: Supplement A to particulars for ANARE, Kingston, Tasmania, 1991, p.204-207.

A project is proposed to determine whether it is possible to hasten and synchronize breeding in subcolonies of royal penguins by manipulating the amount and/or source of social stimulation (i.e. colony sounds) available to colony members.

B-45592

Whitehead, M.D., Cullen, J.M., **Diving behaviour of Adélie penguins in Prydz Bay,** 1991-1992 Australian Antarctic Research Program. Antarctic Treaty exchange information: Supplement A to particulars for ANARE, Kingston, Tasmania, 1991, p.207-211, 9 refs.

This project aims to determine aspects of the diving behavior of Adélie penguins *Pygoscelis adeliae* during their breeding season in Prydz Bay, using a newly developed depth-speed recorder. By elucidating such parameters as ascent and descent rates, dive "bottom" depths, dive durations, dive frequency, dive speeds and dive "stop" events, and determining any diel or seasonal patterns in these parameters, the authors hope to shed light on the penguins' hunting and prey-capture strategies. Possible differences in the hunting strategies of individuals will be investigated by correlating individual dive records with the composition of food brought ashore to feed chicks.

B-45593

Williams, R., **Fisheries investigations in the Heard Island AFZ,** 1991-1992 Australian Antarctic Research Program. Antarctic Treaty exchange information: Supplement A to particulars for ANARE, Kingston, Tasmania, 1991, p.211-214, 1 ref.

A project is proposed to assess the fishery potential of the Australian Fishing Zone around Heard I. and to investigate the biology of the more important species. Data on their distribution and stock size, feeding and reproductive biology, age and growth, recruitment and natural mortality will be collected. This program will be the second of several seasons' work, which eventually will cover a full seasonal cycle. It will provide information on the distribution and abundance of fish stocks, their degree of isolation from each other, and the basic parameters necessary to make initial assessments for management of a commercial fishery, should one arise. Much of the data will be relevant to the management of other well-established fisheries where the effect of fishing cannot be separated from natural phenomena.

B-45600

Roshchin, E.A., **Aspects of the life cycle of *Trematomus eulepidotus* (Nototheniidae) in the Indian Ocean sector of the Antarctic,** *Journal of ichthyology,* Nov. 1991 31(4), p.1-11, Translated from Voprosy ikhtiologii. Refs. p.10-11.

Consideration is given to the size and weight of *Trematomus eulepidotus* inhabiting the marginal seas of the eastern Antarctic. Size groupings segregate by vertical distribution. Most fish reach maturity (stages III and IV) in Feb. Spawning occurred in Mar. 1984 in the D'Urville Sea at a depth of 420-460 m. Analysis of stomach contents revealed that *T. eulepidotus* feeds mainly on euphausiids, especially *Euphausia superba,* hyperiids, and pteropods. Fish are a secondary item in their diet. (Auth.)

B-45601

Culik, B., Wilson, R.P., **Swimming energetics and performance of instrumented Adélie penguins *(Pygoscelis adeliae)*,** *Journal of experimental biology,* 1991 Vol.158, p.355-368, Refs. p.367-368.

The effects of implanted and of externally attached instruments (1.8% of body cross-sectional area) were studied on Adélie penguins using a 21 m long canal in conjunction with respirometry at Hope Bay. Penguins in both groups covered the same mean distance (173 m in 5 min) as controls. Implanted birds preferred to swim at slower speeds than did the controls, whereas penguins with external instruments had a bimodal speed distribution with maxima at 1.7-1.9 and 2.3-2.5 m/s. Power input during swimming averaged 20% less in implanted penguins and 42% more in penguins fitted with external instruments, compared with controls. Similarly, cost of transport was 23% lower in implanted penguins and 25% higher in externally instrumented birds, compared with controls. Possible reasons for the effects caused by the devices are discussed and the advantages and disadvantages of implanted and externally fitted devices are compared. (Auth.)

B-45602

Vosjan, J.H., Olańczuk-Neyman, K.M., **Influence of temperature on respiratory ETS-activity of micro-organisms from Admiralty Bay, King George Island, Antarctica,** *Netherlands journal of sea research,* 1991 28(3), p.221-225, 9 refs.

The respiratory ETS-activity of surface water in an antarctic coastal area is described and the effect of temperature on the ETS-activity of organisms living in a consistently low-temperature regime are analyzed. Secchi disk visibility, temperature, particulate ATP, respiratory electron-transport-system (ETS) activity and bacterial numbers were estimated at 10 stations, 9 in Admiralty Bay and one in Bransfield in Dec. 1990 and Jan. 1991. Admiralty Bay was not ice-free in Dec. Here lower bacterial numbers, ATP and ETS-activities and higher visibilities were found than at the Bransfield Strait station. In the Bay, at some stations low visibility was not correlated with high values of biomass or activity; the turbidity was caused by material imported from the land to the Bay by meltwater from the ice and snow. The effect of temperature on the respiration activity of the microbial ecosystem of Admiralty Bay was investigated. The temperature optimum of the respiration activity was between 20 and 25 C, and the activation energy calculated from the Arrhenius curve showed a strong response to small temperature changes. (Auth. mod.)

B-45605

Beaumont, A.R., Wei, J.H.C., **Morphological and genetic variation in the antarctic limpet *Nacella concinna* (Strebel, 1908),** *Journal of molluscan studies,* Nov. 1991 57(4), p.443-450, 28 refs.

Samples of the antarctic limpet *Nacella concinna* (Strebel, 1908) were collected from four sites in the South Orkney Is. and from Stromness in South Georgia during 1988. At three South Orkney sites, both littoral and sub-littoral samples of limpets were taken. Shell dimensions were measured and littoral and sub-littoral limpets were shown to have significantly different shell shapes. Foot and digestive gland tissues were subjected to electrophoresis and five polymorphic loci and two monomorphic loci were scored. Genetic identities between littoral and sub-littoral forms and also between sites were calculated. At the loci scored, the littoral and sub- littoral forms were virtually identical and this suggests that the shell shape differences between the forms are the result of environmentally induced phenotypic plasticity. However, significant genetic differences and some morphological differences were apparent between the limpet samples from South Georgia and all other sites. Genetic identity values suggested that the South Georgia and South Orkney *N. concinna* are geographically separated populations of a single species, rather than distinct sub-species. (Auth.)

B-45607

Smith, R.I.L., **Exotic sporomorpha as indicators of potential immigrant colonists in Antarctica,** *Grana,* 1991 30(2), International Conference on Aerobiology, 4th, Aug. 1990, Stockholm. Proceedings, Part II, edited by M. Hjelmroos, S. Nilsson, and G. El-Ghazaly, p.313-324, 48 refs.

A brief account is given documenting the development of aerobiological research in the Antarctic. The results of the British Antarctic Survey's contribution to an international program on long-distance dispersal of aeroplankton over the southern ocean are presented. This was achieved by collecting airspora deposited in Tauber traps and in surface snow at sites on South Georgia (sub-antarctic) and Signy I. (maritime Antarctic). Although only a small number of the samples were analyzed, the results provided ample evidence of a continuous immigration of exotic sporomorpha of southern South American provenance. This rain of biological material is attributed to the frequent easterly tracking storms generated over the southeast Pacific Ocean. As they gain momentum over southern South America they become seeded with pollen and spores, and possibly by larger organelles such as invertebrates and seeds. These high winds may be deflected southwards by a blocking anticyclone over the South Atlantic Ocean, allowing a portion of the sporomorpha to be deposited over land far to the south. The occurrence of such exotic sporomorpha in these remote and environmentally hostile regions is used here as evidence to support the hypothesis that there is a continuous input into the antarctic biome of viable propagules from more northerly landmasses. (Auth. mod.)

B-45608
Wynn-Williams, D.D., **Aerobiology and colonization in Antarctica—the BIOTAS programme,** *Grana,* 1991 30(2), International Conference on Aerobiology, 4th, Aug. 1990, Stockholm. Proceedings, Part II, edited by M. Hjelmroos, S. Nilsson, and G. El-Ghazaly, p.380-393, 65 refs.

Little is known about the aerial transport of microbes, plants and animals into and between antarctic terrestrial and freshwater habitats. Isolation by the circumpolar southern ocean restricts propagules to three main groups: 1) those capable of prolonged survival in the air, 2) those carried by animal vectors, especially Man, and 3) those of marine origin. Diverse ice-free areas available for colonization include: isolated islands with receding ice sheets (e.g., Signy I.), maritime geothermal areas (e.g., Deception I.), and high altitude geothermal areas on continental volcanoes (e.g., Mt. Erebus). Propagule abundance and diversity are low in Antarctica. Chance affects colonization success because the potential and viability of a propagule must match a favorable habitat for settlement, with adequate time for establishment before conditions become unfavorable. Aerobiological studies of the whole antarctic region require international cooperation. The Scientific Committee on Antarctic Research (SCAR) Biological Investigations of Terrestrial Antarctic Systems (BIOTAS) research network has identified aerobiology as a major component of its International Research Programme. (Auth. mod.)

B-45609
Harmata, K., Olech, M., **Transect for aerobiological studies from Antarctica to Poland,** *Grana,* 1991 30(2), International Conference on Aerobiology, 4th, Aug. 1990, Stockholm. Proceedings, Part II, edited by M. Hjelmroos, S. Nilsson, and G. El-Ghazaly, p.458-463, 6 refs.

While returning from the 13th Polish Scientific Expedition to Antarctica, one of the authors (M.O.) collected airborne biological samples along the transect from the South Shetland Is. to Gdynia on the Baltic seacoast of Poland. The journey aboard the Polish ship ORP *Heweliusz* lasted from Mar. 4 until Apr. 13, 1990. During this period, two samples a day, exposed 12 h each, were collected in Petri dishes. The authors made preliminary identifications of plant and animal fragments in the samples. The most important finding was the presence of propagules of lichens (fragments of thallus, isidia soredia) in all samples. The relatively small number of pollen grains in samples could be accounted for by the season of collection when few pollen grains are airborne. (Auth.)

B-45610
Stack, J.H., Platvoet, D., **Freshwater amphipoda of the Falkland Islands,** *Journal of natural history,* Nov.-Dec. 1991 25(6), p.1469-1491, 24 refs.

All four species of freshwater amphipods recorded in the literature from the Falkland Is. were found again during a recent expedition. *Hyalella curvispina* Shoemaker has been previously recorded, but under several incorrect names. *Hyalella neonoma* nom. nov. is proposed for the preoccupied name *H. patagonica,* the most common species in the collections. *Falklandella obtusa* Schellenberg and *F. cuspidata* Schellenberg are completely redescribed, and the latter is removed to a new genus, *Praefalklandella.* According to their external morphology, the last two genera belong to the Crangonyctoidea, but the calceoli discovered on both antennae of the male of *Praefalklandella* are surprisingly of the 'gammarid' type, not the 'crangonyctid' type. (Auth.)

B-45612
Smith, V.R., **Terrestrial slug recorded from sub-antarctic Marion Island,** *Journal of molluscan studies,* Feb. 1992 58(1), p.80-81, 12 refs.

The occurrence is reported of the limacid slug *Deroceras caruanae* on Marion I. It seems likely that the species was introduced since the establishment of the station in 1949; however, the first record of the species was not until 1972, near the station. Because Marion, in common with other sub-antarctic islands, is species poor and since slugs act as both herbivores and detritivores, they may be of considerable significance for energy and nutrient transfers. These conditions provide a superb opportunity to study the colonization and establishment of an invasive alien organism and its effect on an ecosystem structure and function.

B-45622
Rauschert, M., Andres, H.G., ***Thaumatelsonella kingelepha,* a new genus and species from Antarctica (Crustacea:Amphipoda:Gammaridea:Stenothoidae)** [*Thaumatelsonella kingelepha,* eine neue Gattung und Art aus der Antarktis (Crustacea:Amphipoda:Gammaridea:Stenothoidae)], *Helgoländer Meeresuntersuchungen,* 1991 45(1-2), p.225-235, In German with English summary. 9 refs.

A taxonomic study on stenothoid amphipods from the area of South Shetland Is. led to the description of *Thaumatelsonella kingelepha* gen. and sp. nov. The systematic position of *Pseudothaumatelson cyproides* Nicholls, 1938 is discussed, as the redescription by Bellan- Santini & Ledoyer (1986) based on the first recovery of that species included differences from the diagnosis of the genus. (Auth.)

B-45624
Di Prisco, G., ed, **Life under extreme conditions: biochemical adaptation,** Federation of European Biochemical Societies (FEBS) Meeting, 19th, Rome, July 1989, Berlin, Heidelberg, Springer-Verlag, 1991, 144p., For selected papers see B-45625 through B-45627.

DLC QP82.L54 1991

The scientific program of the 19th FEBS (Federation of European Biochemical Societies) Meeting, Rome, July 2-7, 1989 included a session on "Biochemistry under Extreme Life Conditions". These conditions include low and high temperatures and high concentration of salts. Some of the specializations achieved through the evolutionary trends during cold adaptation are illustrated in three of the contributions, dealing with: freezing resistance; in contrast to arctic fish, which produce "antifreeze" proteins only seasonally, antarctic teleosts need these molecules in the interstitial fluids all year round; cold- stable microtubules: tubulins assemble and form microtubules at temperatures that in warm-blooded organisms favor dissociation; and the biochemistry of oxygen transport: the hematological adaptation of antarctic fish compensates for the increase in blood viscosity caused by low temperatures; the colorless blood of the species of one family has neither hemoglobin nor erythrocytes. (Auth. mod.)

B-45625
Cheng, C.C., DeVries, A.L., **Role of antifreeze glycopeptides and peptides in the freezing avoidance of cold-water fish,** Life under extreme conditions: biochemical adaptations, edited by G. Di Prisco. Papers from the 19th FEBS Meeting, Rome 1989, Berlin, Heidelberg, Springer-Verlag, 1991, p.1-14, 60 refs.

DLC QP82.L54 1991

The process and chemistry of freezing point depressants in blood streams of cold water fish are reviewed and the maintenance of the delicate balance for survival is explained. In most temperate marine fish, sodium chloride is responsible for 85% of the freezing point depression. The remainder of the freezing point depression is due to small amounts of potassium, calcium, urea, glucose, and the free amino acids. The history of the various biochemical chains which evolved into a family of antifreeze glycopeptides (AFPGs) and peptides (AFPs) is told. Several physical adaptations for survival in fish without the AFPGs or AFPs, or fish whose blood temperature, even with the antifreezes, is above that of the environment, are discussed.

B-45626
D'Avino, R., **Overview of the molecular structure and functional properties of the hemoglobins of a cold-adapted antarctic teleost,** Life under extreme conditions: biochemical adaptations, edited by G. Di Prisco. Papers from the 19th FEBS Meeting , Rome 1989, Berlin, Heidelberg, Springer-Verlag, 1991, p.15-33, 55 refs.
DLC QP82.L54 1991

The aim of this study is to gain an insight into the molecular basis of fish cold adaptation, as well as into the evolutionary history of the development of these features in fish, during the isolation that followed the separation and drift of Antarctica from Gondwana. *Notothenia coriiceps neglecta* is one of the species biologically adjusted to survive the environmental temperature. The erythrocytes of this species contain two hemoglobins, which have been purified by ion-exchange chromatography and obtained in crystalline form: Hb 1 (about 90% of total) and Hb 2 (about 5%). This chapter reports the complete amino acid sequence of the two hemoglobins of *N. coriiceps neglecta,* as well as the effect of pH and of some physiological effectors (organic phosphates) on the oxygen- binding properties of erythrocytes and hemoglobins (Bohr and Root effects). (Auth. mod.)

B-45627
Detrich, H.W., III, **Cold-stable microtubules from antarctic fish,** Life under extreme conditions: biochemical adaptations, edited by G. Di Prisco. Papers from the 19th FEBS Meeting, Rome 1989, Berlin, Heidelberg, Springer-Verlag, 1991, p.35-49, 35 refs.
DLC QP82.L54 1991

To learn about the molecular adaptations that are responsible for microtubule assembly in poikilotherms, the coastal fish of the Antarctic Peninsula have been chosen as its model system. These cold-adapted fish diverged from temperate osteichthyans approximately 40 million years ago, concomitant with the isolation of the antarctic continent in a cooling southern ocean. Near Palmer Station these stenothermal fish live at an annual mean bottom temperature of -1.0 C. Thus, antarctic fish constitute a unique fauna that is well suited to the study of cold-stable microtubules. The formation of microtubules at low temperatures may result from altered tubulins, from unique microtubule-associated cold-stabilizing factors, or from both. Pure (MAP)-free brain tubulins from antarctic fish polymerize efficiently at the low body temperatures experienced by these extreme poikilotherms. Therefore, the major assembly-enhancing adaptations of the antarctic fish microtubule proteins reside in their tubulins, not in their MAPs. Laboratory studies of the polymerization energetics of antarctic fish tubulins and of the structures of the component *alpha-* and *beta*-tubulin subunits are reviewed. The results suggest that the functional adaptations of these tubulins include increases in the proportion or in the strength (or both) of the hydrophobic interactions that mediate microtubule assembly, and that many of the adaptations are present in their unique *alpha*-chains. (Auth. mod.)

B-45709
Duhamel, G., Hureau, J.C., **Additional data on subantarctic ichthyofauna of the French southern islands** [Donnees complementaires sur l'ichtyofaune des iles australes francaises], *Cybium,* 1982 6(1), p.65-80, In French with English summary. 29 refs.

The authors describe new records of fish discovered around Saint Paul, Amsterdam, and Kerguelen Islands. Seven pelagic species are newly recorded from Saint Paul and Amsterdam Islands; 17 recently described species, or new records, are presented from Kerguelen Is. These new data extend the geographic distribution of some families, such as Squalidae and Carangidae. (Auth.)

B-45710
Dewitt, H.H., **Reports on fishes of the University of Southern California Antarctic Research Program, 1962-1968. 1. A review of the genus *Bathydraco* Günther (family Bathydraconidae),** *Cybium,* Nov. 30, 1985 9(3), p.295-314, 24 refs.

A diagnosis and description of *Bathydraco* are presented, the most salient characteristics being scales, a single lateral line, and opercles not armed with spinous points or a hook. The genus is compared with other bathydraconid genera and a key to the species is given. Diagnosis and descriptive notes, based on the *Eltanin* material as well as type specimens, are presented for the four previously known species *(B. scotiae, B. antarcticus, B. macrolepis,* and *B. marri). B. joannae,* sp. nov., is described and figured. The distribution and relationships of the species are discussed. The deepwater *B. scotiae* stands apart from the others, which form two pairs, each with a deeper and a shallower (though overlapping) member: *B. antarcticus* and *B. macrolepis; B. joannae* and *B. marri.* (Auth.)

B-45711
Shimizu, C., Allahpichay, I., Tokoro, T., Shirakawa, Y., **Feeding stimulation in sea bream, *Pagrus major,* fed diets supplemented with antarctic krill meals,** *Aquaculture,* Aug. 15, 1990 89(1), p.43-53, 25 refs.

Feeding behavior is stimulated when fish are fed diets supplemented with antarctic krill meal. An electrophysiological method was used to study the olfactory and gustatory responses of sea bream, *Pagrus major,* to extracts of krill meal, non- muscle krill meal, and white fish meal. It was observed that the non-muscle krill meal elicited the strongest responses; non- muscle krill meal gave about 1.5 times and krill meal 1.2 times the response of the white fish meal. Amino acid analysis of the meals indicated that non-muscle krill meal was high in sarcosine, proline, glutamic acid, arginine and glucosamine. These amino acids are believed to be the cause of the gustatory and olfactory responses observed. Several diets containing these amino acids were tested for feeding stimulation in sea bream. It was shown that sea bream feeding was stimulated mainly by proline, glycine and glucosamine. (Auth.)

B-45712
Johnston, I.A., **Morphometric and ultrastructural features of the ventricular myocardium of the haemoglobin-less icefish *Chaenocephalus aceratus,*** *Comparative biochemistry and physiology,* 1983 76A(3), p.475-480, 29 refs.

The relationship between heart ventricle weight and body weight has been determined for three species of antarctic fish with respiratory pigments *(Notothenia gibberifrons, Notothenia neglecta* and *Notothenia rossii)* and the haemoglobinless icefish *Chaenocephalus aceratus..* Relative heart weights of Notothenidae are similar to those of other teleosts whilst those of Channichthyidae are similar to those reported for tuna and small mammals. The volume densities of mitochondria and myofibrils for ventricular myocytes were 0.47 and 0.25 respectively. The values for mitochondrial volume density are higher and those for myofibrillar volume density lower than for most vertebrate hearts. Some unusual characteristics of these mitochondria are reported and discussed in relation to the unique constraints characterizing this type of heart. (Auth.)

B-45713
Ozouf-Costaz, C., **Karyotypes of *Chaenodraco wilsoni* and *Chionodraco myersi* (Channichthyidae) from Prydz Bay, Antarctica,** *Copeia,* May 13, 1987 No.2, p.503-505, 4 refs.

Specimens of two species of Channichthyidae, *Chionodraco myersi* De Witt and Tyler, 1960 and *Chaenodraco wilsoni* Regan, 1914, were collected from Prydz Bay during the international cruise MD42/SIBEX of R.V. *Marion- Dufresne.* Despite the small amount of material available, the results may be used as additional information for the analysis of evolutionary processes at the chromosomal level in this family and in the suborder Notothenioidei.

B-45714

Seppälä, M., ***Rinodina endophragmia,* a lichen from the Vestfjella, Dronning Maud Land, Antarctica,** *Annales botanici fennici,* 1991 28(3), p.193-196, 18 refs.

Rinodina endophragmia Lamb is reported as the only lichen so far detected at Basen, Queen Maud Land, in a region with an annual mean temperature of *ca.*-20 C. The locality is the second one known in Antarctica for this saxicolous species. These two specimens were growing on the fine mineral matrix (glacial till) among wind-worn and polished basaltic pebbles. The specimen contains zeorin. (Auth.)

B-45715

Balushkin, A.V., Fedorov, V.V., **Two new species of deepwater anglerfishes in the Ross Sea** [O nakhozhdenii dvukh glubokovodnykh udil'shchikov v more Rossa (Antarktika)], *Biologiia moria,* 1981 No.2, p.79-82, In Russian with English summary. 16 refs.

The first representative of the family Melanocetidae, *Melanocetus rossi* off the antarctic coast is described as a new species, distinguished from others by a complex of features: the numbers of rays in pectoral and anal fins, the size of esca, and teeth in the jaws. *Oneirodes notius* is recorded in the Ross Sea also for the first time. (Auth.)

B-45720

Thompson, K.R., **Quantitative analysis of the use of discards from squid trawlers by black-browed albatrosses *Diomedea melanophris* in the vicinity of the Falkland Islands,** *Ibis,* Jan. 1992 134(1), p.11-21, 28 refs.

In the past decade, a major trawl fishery for the squid *Loligo gahi* has developed in the vicinity of Beauchêne I., an internationally important breeding site for the Black-browed Albatross *Diomedea melanophris.* The breeding season diet of this albatross in the Falklands and its use of discards generated by the *Loligo* fishery were investigated. Albatross chicks are fed extensively on commercially exploited species of squid and fish including *L. gahi* and southern blue Whiting *Micromesistius australis.* The quantity of waste generated by the *Loligo* fishery amounts to c. 5% of the reported catch and just over 50% of this waste, mainly *Loligo* and nototheniid fish, is scavenged by adult Black-browed Albatrosses. The total quantity scavenged during the chick-rearing period amounts to 1,000-2,000 tonnes per year. This is equivalent to 10-15% of the total food requirement of the breeding Black-browed Albatross population on Beauchêne I. during the period when the fishery is operating. Although the *Loligo* fishery currently provides a significant quantity of food to these albatrosses, its net effect may be detrimental to them, as it is a much greater predator of *Loligo* stocks than the albatrosses are estimated to have been prior to the fishery's development. (Auth.)

B-45721

McDonald, J.H., Seed, R., Koehn, R.K., **Allozymes and morphometric characters of three species of *Mytilus* in the Northern and Southern Hemispheres,** *Marine biology,* Dec. 1991 111(3), p.323-333, 65 refs.

Samples of mussels were collected from 36 locations in the Northern Hemisphere and nine locations in the Southern Hemisphere. Electrophoretic evidence from eight loci indicates that the Northern Hemisphere samples consist of three electrophoretically distinguishable species: *M. edulis* Limaeus, 1758; *M. galloprovincialis* Lamarck, 1819; and *M. trossulus* Gould, 1850. Mussels from Chile, Argentina, the Falkland Is. and the Kerguelen Is. contain alleles characteristic of all three Northern Hemisphere species, but because they are most similar to *M. edulis* from the Northern Hemisphere, it is suggested that they tentatively be included in *M. edulis.* These South American samples are morphologically intermediate between Northern Hemisphere *M. edulis* and *M. trossulus.* Mussels from Australia and New Zealand are similar in allele frequency and morphometric characters to *M. galloprovincialis* from the Northern Hemisphere. Fossil *Mytilus* sp. are present in Australia, New Zealand and South America, which suggests that the Southern Hemisphere populations may be native, rather than introduced by humans. Morphometric characters were measured in samples which the allozyme data indicated contained a single species. Canonical variates analysis of the morphometric characters yields functions which distinguish among the samples of the species in the Northern Hemisphere. (Auth. mod.)

B-45722

Nöthig, E.M., Gowing, M.M., **Late winter abundance and distribution of phaeodarian radiolarians, other large protozooplankton and copepod nauplii in the Weddell Sea, Antarctica,** *Marine biology,* Dec. 1991 111(3), p.473-484, 36 refs.

Large (>64 microns) protozooplankton and copepod nauplii were sampled at six stations located in sea-ice-covered waters, using a multinet at five depth intervals between the surface and 1000 m depth on a west-east transect across the Weddell Sea in 1989. Large (>400 microns) phaeodarian radiolarians contributed more than 98% of the carbon in the large protozooplankton fraction; large protozooplankton represented *ca.* 38% of the total protozooplankton carbon during late winter under the close pack ice in the upper 250 m. Large protozooplankton may therefore be an important food source for small particle-feeding zooplankton in the upper 250 m, and a modest food source down to 1000 m. Phaeodarian species distributions showed a distinct vertical pattern. Except for spumellarian and nassellarian radiolarians, all other protozooplankton were most abundant in the upper 250 m. Feeding ecology of the dominant species of phaeodarians was examined using transmission electron microscopy of contents of feeding vacuoles. The 58 specimens were trophic generalists. The predominance of silica fragments and amorphous material in vacuoles and the similarity of vacuole contents of specimens from three depth zones suggest that phaeodarians in late winter may have fed on organic aggregates. (Auth. mod.)

B-45723

Delille, D., Cahet, G., **Short-term changes of marine bacterioplankton in antarctic coastal environment,** *Estuarine, coastal and shelf science,* Dec. 1991 33(6), p.581-588, 26 refs.

Observations of the short-term changes of seawater bacterioplankton were carried out during the summer of 1988 in antarctic coastal surface waters. The studies were designed to compare the variations of bacterioplankton in free-moving and enclosed seawater. Even when a diurnal cycle is present, the data collected from the enclosed seawater experiments remain much nearer constant than the corresponding data in free-moving seawater. The wide range of parameters used in the two experiments reveals common properties which illustrate the major role of displacements of water masses at a fixed sampling station in the temporal changes observed in free-moving antarctic coastal seawater. (Auth.)

B-45728

Uva, B.M., Masini, M.A., Devecchi, M., Napoli, L., **Renin-angiotensin system in antarctic fishes,** *Comparative biochemistry and physiology,* 1991 100A(4), p.897-900, 23 refs.

The presence of a renin-angiotensin-like system has been investigated in the antarctic fishes *Chionodraco hamatus* (Fam. Channichthydae) and *Pagothenia (Trematomus) bernacchii* (Fam. Notothenidae). A renin-like activity is present in plasma and kidney of both the white blooded *(Chionodraco)* and the red blooded *(Pagothenia)* species. An angiotensin converting enzyme-like activity has been demonstrated in plasma, gills and kidneys of both species. The activity is inhibited by high temperature. The data show that a renin-angiotensin-like system is present in the antarctic fishes studied but the cascade of enzymes is active only at low temperatures. (Auth.)

B-45729

Stenroos, S., **Lichen genera *Parmelia* and *Punctelia* in Tierra del Fuego,** *Annales botanici fennici,* 1991 28(3), p.241-245, 24 refs.

Four species of *Parmelia* Ach. and one species of *Punctelia* Krog are reported from Tierra del Fuego and their local distribution is mapped. *Parmelia saxatilis* (L.) Ach., *P. sulcata* Taylor and *Punctelia stictica* (Del. ex Duby) Krog have an essentially bipolar distribution pattern, while the range of *Parmelia cunninghamii* Crombie and *P. protosulcata* Hale is austral. In Tierra del Fuego *P. sulcata* chiefly occupies the drier regions in the central and northeastern parts of the area, while its close relative *P. protosulcata* is confined to the wettest forests on the southwestern coast. *P. kerguelensis* Wilson is reduced to synonymy with *P. saxatilis* (L.) Ach.

B-45731

Myrcha, A., Tatur, A., **Ecological role of the current and abandoned penguin rookeries in the land environment of the maritime Antarctic,** *Polish polar research,* 1991 12(1), p.3-24, With Polish summary. 65 refs.

The role of penguin rookeries in the functioning of the land ecosystems in the maritime Antarctic is examined. The origins of phosphatic ornithogenic soil in the areas of currently active penguin rookeries are presented. In the maritime Antarctic there occurs a rapid microbiological decomposition and mineralization of large amounts of excrement carried into coastal area by penguins during breeding periods. Chemically aggressive water solutions of guano react with underlaying rocks. This process brings about the occurrence of wide zones of phosphatization. This results in the appearance of a series of phosphate minerals whose composition and properties depend on the changing physical and chemical conditions of the soil environment. It has been discovered that in the abandoned rookeries phosphates are still present in large amounts and have been for hundreds, or even thousands of years, a source of nutrients for plants growing in poor antarctic land ecosystems. These soils came to be called the relic ornithogenic soils of the maritime Antarctic. The stages of plant colonization in the abandoned penguin rookeries were traced. The differences in the fate of the organic matter carried from the sea to the coastal area by sea-birds in various climatic zones are discussed. (Auth. mod.)

B-45732

Sierakowski, K., **Birds and mammals in the region of SSSI No.8 in the season 1988/89 (South Shetlands, King George Island, Admiralty Bay),** *Polish polar research,* 1991 12(1), p.25-54, With Polish summary. 18 refs.

In the breeding season 1988/89, within the region of SSSI No.8, nesting of 12 species of birds was observed. The highest number of nests—24,430—belonged to three species of pygoscelid penguins; 77.1% were the Adélie penguin. Relatively high fluctuations in the number of penguins in some rookeries in particular breeding seasons were confirmed. During regular countings of mammals in 1988 the presence of 5 species of *pinnipedia* was noted, of which the southern elephant seal was most numerous in the summer season, while crabeater seal was most numerous in winter. In the region of SSSI No.8, breeding of southern elephant seals and Weddell seals was observed. Fluctuations in the number of seals in this region in the period 1977-1988 were insignificant. (Auth.)

B-45733

Zdzitowiecki, K., **Occurrence of digeneans in open sea fishes off the South Shetland Islands and South Georgia, and a list of fish digeneans in the Antarctic,** *Polish polar research,* 1991 12(1), p.55-72, With Polish summary. 38 refs.

A total of 704 fishes representing 39 species were examined. Twenty-five digenean species were recognized. Only one species previously found by the author in a fiord of this area was absent in the material. Pelagic species were usually not parasitized by digeneans, while demersal fishes were normally found to be infected. Results of the present study are compared to those from fiords. Seven species are widely distributed. Two of them, *Macvicaria pennelli* and *Genolinea bowersi,* are associated with an inshore fiord environment and can be used as biological tags indicating the association of hosts with this kind of environment. Three widely distributed species, *Lepidapedon garrardi, Elytrophalloides oatesi* and *Lecithaster macrocotyle,* are not clearly associated with any environment. *Gonocerca phycidis, Neolebouria antarctica* and other less widely distributed species, with the exception of *Postmonorchis variabilis,* are associated with deep fiords and/or open sea shelf environments. The level of infection of open sea fish at the South Shetlands was low. Many fish species living at South Georgia were massively infected; the dominant species in this area is *E. oatesi,* which was rare off the South Shetland Is. A total of 45 digenean species occurring in the antarctic fish are listed. Eleven of them are not endemic. (Auth.)

B-45734

Kolakowska, A., **Influence of sex and maturity stage of krill *(Euphausia superba* Dana) upon the content and composition of its lipids,** *Polish polar research,* 1991 12(1), p.73-78, With Polish summary. 6 refs.

Using thin layer chromatography, the author examined the content and composition of krill lipids in different sex and maturity stages. The content of lipids decreased in the following sequence: immature males, females with eggs, juvenile specimens, spent females, mature males. In females the differences concerned mainly phospholipids and waxes, in males, triacylglicerols; this fact proves the different utilization of lipids for reproduction in both sexes. (Auth.)

B-45735

Kolakowska, A., **Lipid composition of some antarctic Crustacea,** *Polish polar research,* 1991 12(1), p.79-89, With Polish summary. 14 refs.

The composition of lipids of some antarctic Crustacea *(Euphausia superba, E. triacantha, Thysanoessa macrura* and Mysidacea gen. sp. indet.) caught in the Admiralty Bay (South Shetlands) was compared. Lipids of *E. superba* differed in their low content of waxes, which shows different management of lipids than in other examined Crustacea. (Auth.)

B-45736

Kolakowska, A., **Oxidability of krill lipids,** *Polish polar research,* 1991 12(1), p.89-104, With Polish summary. 22 refs.

The photo-oxidability of lipids taken from 32 samples of krill from different dates of catch has been examined for photooxidation. Relations are indicated among the rate of accumulation of peroxides in the process of lipids, exposure and content of lipids in krill, its iodine value, and amount of carotenoids. (Auth.)

B-45737

Rakusa-Suszczewski, S., Krzyszowska, A., **Assessment of the environmental impact of the H. Arctowski Polish Antarctic Station (Admiralty Bay, King George Island, South Shetland Islands),** *Polish polar research,* 1991 12(1), p.105-121, 17 refs.

The Station was opened in Feb. 1977 at Admiralty Bay and in its fifteen years of operation has been subjected to a number of factors affecting the environment, including the climate and the clash between the waters of the bay and the glaciers of the land. The risks of damage to the environment emanate from human occupancy, the technology introduced, and the need that all necessary materials must be brought in with attendant transport and material packaging risks. The number of people visiting or based at the Station has increased, as has the risk of infection to those who are long-time inhabitants; cockroaches have been observed. Statistically, since the Station opened the total load delivered to the area of 0.28 sq km is 48.9 kg/sq m; the average amount of food delivered is 4.9 kg/person/day and the average amount of water used is 123 l/person/day. The global pollution problems have appeared here also, as trace atmospheric DDT, DDD, DDE, HCH, and PCB have been observed in phytoplankton, in birds and their eggs, and all Pinniped species. Seven actions are suggested to minimize the negative influences at Arctowski Station.

B-45738

Janiec, K., **Further note on *Branchinecta gaini* (Daday, 1910) population from the region of the H. Arctowski Station (King George Island, South Shetland Islands),** *Polish polar research,* 1991 12(1), p.123-127, 6 refs.

Over a ten year period following the first data on the distribution and life cycle of *B. gaini* in fresh-water ponds near Arctowski Station, observations on its population abundance and structure were repeated. *B. gaini* were found in only three of the nine ponds; body length had not changed significantly; sex ratio m/f changed significantly in pond VII. Population abundance seems to have decreased, perhaps caused by inflow of sewage to ponds I and II.

B-45739

Olech, M., **Preliminary observations on the content of heavy metals in thalli of *Usnea antarctica* Du Ritz (Lichenes) in the vicinity of the H. Arctowski Polish Antarctic Station,** *Polish polar research,* 1991 12(1), p.129-131, 5 refs.

Trace elements of Ti, Cr, Mg, Fe, Cu, Ni, Zn, and Pb were measured in the thalli of *U. antarctica* growing near the Station and, for comparison, from some growing in the Jerzak Hills at some distance from the Station. Ni measurements at the Station showed 1 ppm and at the Jerzak Hills, 2 ppm. In all other metals the ppm measurements were higher near the Station, at levels ranging from 1.5 to 7 times as great as those taken in the Jerzak Hills.

B-45742

Alexander, D.J., **Characterization of paramyxoviruses isolated from penguins in Antarctica and sub-Antarctica during 1976-1979,** *Archives of virology,* 1989 109(1-2), p.135-143, 16 refs.

Nine paramyxovirus isolates obtained from penguins were tested for antigenic relationships amongst themselves and to other avian paramyxoviruses. One of the isolates was shown to be a lentogenic Newcastle disease virus (NDV), i.e., of PMV-1 serotype. By serological tests and analysis of structural polypeptides the other penguin isolates could be placed into three groups. No relationships with other avian paramyxoviruses could be determined except that six of the penguin viruses, representing two of the groups, showed reaction with a monoclonal antibody raised against NDV Ulster 2C and three of the isolates, representing one of the penguin groups, also reacted with another PMV-1 directed monoclonal antibody. (Auth.)

B-45755

Bitner, M.A., **Supposedly new brachiopod from the Paleogene of Seymour Island, West Antarctica,** *Polish polar research,* 1991 12(2), p.243-246, With Polish summary. 10 refs.

The species of the brachiopod genus *Terebratella d'Orbigny* is described, which does not correspond to any one reported hitherto from the upper Eocene-?lower Oligocene La Meseta Formation of Seymour I., but shows a strong affinity to the Recent *T. inconspicua* (Sowerby). (Auth.)

B-45757

Dailey, M.D., Vogelbein, W.K., **Parasite fauna of three species of antarctic whales with reference to their use as potential stock indicators,** *Fishery bulletin,* July 1991 89(3), p.355-365, 31 refs.

Seventeen species of parasites representing the Cestoda, Nematoda, Acanthocephala, and Crustacea are reported from three species of antarctic whales. Thirty-five sei whales *Balaenoptera borealis,* 106 minke whales *B. acutorostrata,* and 35 sperm whales *Physeter catodon* were examined from latitudes 30 to 64S, and between longitudes 106E to 108W, during the months of Nov. to Mar. 1976-77. Collection localities and regional helminth fauna diversity are plotted on distribution maps. Antarctic host-parasite records from *B. borealis, B. acutorostrata,* and *P. catodon* are updated and tabulated by commercial whaling sectors. The use of acanthocephalan parasites of the genus *Corynosoma* as potential antarctic sperm whale stock indicators is discussed. (Auth.)

B-45817

Culik, B.M., Wilson, R.P., Woakes, A.T., Sanudo, F.W., **Oil pollution of antarctic penguins: effects on energy metabolism and physiology,** *Marine pollution bulletin,* Aug. 1991 22(8), p.388-391, 27 refs.

In the vicinity of antarctic stations, the environment and associated wildlife are threatened by pollution. The authors propose that penguins are particularly susceptible, and present behavioral and physiological data on oiled Adélie penguins in air and in water compared to non-oiled birds. In air, oiled penguins had reduced heart rate (90 *vs.* 98 bpm), body temperature (38.6 *vs.* 39.2 C) and energy expenditure (4.7 *vs.* 5.2 W/kg) compared to controls, respectively. In a swim tank, oiled penguins tried to leave the water and showed erratic swimming behavior. Their swimming speed was lower than that of controls (1.6 as opposed to 1.8 m/s) and they had an increased heart rate at the surface (321 *vs.* 252 bpm). Metabolic rate while swimming was 50% higher in oiled birds than in controls (18.8 *vs.* 12.7 W/kg), and cost of transport was 73% higher (12.1 *vs.* 7 J/kg/m). (Auth.)

B-45818

Harrisson, P.M., Rothery, P., Block, W., **Drying processes in the antarctic collembolan *Cryptopygus antarcticus* (Willem),** *Journal of insect physiology,* 1991 37(12), p.883-890, 34 refs.

Live and dead specimens of the antarctic collembolan *Cryptopygus antarcticus* (Willem) dry, under constant external conditions of temperature (24 or 35 C) and r.h. (0%), like most hygric soil arthropods. The drying curves of both live and dead specimens have three phases: an initial decrease; a constant rate period and a final falling rate period. The latter is exponential. *Cryptopygus* dries throughout these phases in a purely physical, passive manner. The constant rate period is not indicative of active metabolic or physiological regulation of water loss. The entire drying curve can be explained using drying theories developed for porous hygroscopic solids. A similar situation pertains in the antarctic lichen *Umbilicaria antarctica* Frey et Lamb. Geometrically, the percentage of water remaining at the onset of the falling rate period is related to the hydrated thickness of the collembolan cuticle or the lichen cortices. For *Cryptopygus* the hydrated thickness is estimated as 14 microns. (Auth.)

B-45841
Tamburrini, M., Brancaccio, A., Ippoliti, R., Di Prisco, G., **Amino acid sequence and oxygen-binding properties of the single hemoglobin of the cold-adapted antarctic teleost *Gymnodraco acuticeps*,** *Archives of biochemistry and biophysics,* Jan. 1992 292(1), p.295-302, 33 refs.

The complete amino acid sequence of the single hemoglobin of the antarctic teleost *Gymnodraco acuticeps* has been determined. The *alpha* chain contains 142 amino acid residues; an acetylated seryl residue is at the amino terminal. The *beta* chain contains 146 residues. A very high degree of sequence identity has been found with hemoglobins of other antarctic fishes. Oxygen binding is not modulated by pH and allosteric effectors. The Bohr and Root effects are absent, although specific amino acid residues, considered responsible for most of these functions, are conserved in the sequence, thus posing new questions about the molecular basis of these mechanisms. The low heat of oxygenation may be interpreted as one of the mechanisms involved in the process of cold adaptation. (Auth.)

B-45842
Buck, K.R., Bolt, P.A., Betham, W.N., Garrison, D.L., **Dinoflagellate cyst from antarctic sea ice,** *Journal of phycology,* Feb. 1992 28(1), p.15-18, 17 refs.

The small (<15 microns) hypnozygote of an autotrophic athecate dinoflagellate found in association with antarctic sea ice had an external covering composed of approximately 60 plates, each of which was bounded by sutural ridging and possessed an intratabular process. A cingulum and sulcus were also evident. The ultrastructure of the cyst was increasingly dominated by storage bodies as the cyst matured, and the cell wall thickened from 0.2 to 0.8 micron over 2 months. This cyst has been encountered often but usually at low abundances (1000-10,000 cells/L); however, the maximum abundances observed (1 million cells/L) indicate that the formation of this cyst may play an important part in the ecology of sea ice communities. (Auth. mod.)

B-45844
Hyvönen, J., ***Chorisodontium* (Dicranaceae, Musci) in southern South America,** *Annales botanici fennici,* 1991 28(3), p.247-258, 21 refs.

The genus *Chorisodontium* (Mitt.) Broth. in southern South America is revised. Five species are present in the area, *C. aciphyllum* (Hook. f. & Wils.) Broth., *C. dicranellatum* (C. Müll.) Broth., *C. luridum* Bartr., *C. magellanicum* (Card.) Bartr. and *C. spegazzinii* (C. Müll.) Roiv. For each species a brief description and diagnosis are given, the distribution is outlined and the ecology discussed. A key to the species in southern South America is given. The type specimens are indicated and the nomenclature discussed. The lectotype is selected for *C. sphagneticola* Roiv. (=*C. aciphyllum).* Six names are given as new synonyms. A provisional cladistic analysis of the whole genus is presented. Several of the species identified in this study occur in various antarctic and subantarctic locations, including South Georgia and King George I. (Auth. mod.)

B-45846
Buck, K.R., Garrison, D.L., Hopkins, T.L., **Abundance and distribution of tintinnid ciliates in an ice edge zone during the austral autumn,** *Antarctic science,* Mar. 1992 4(1), p.3-8, Refs. p.7-8.

Tintinnid ciliates were present throughout the upper (100 m) water column of the ice-edge zone when sampled in autumn 1986 in the Weddell Sea. Biomass ranged from 0.02 micrograms C/l under the sea-ice to 1.3 micrograms C/l in the ice-free water column. *Cymatocylis, Codonellopsis, Laackmaniella* and a small *Salpingella* were the most abundant and/or largest biomass contributors. The under ice assemblage was characterized by low biomass and dominated by small species *(Salpingella* and *Codonellopsis);* the ice edge stations were dominated by these same taxa but in higher abundances, while the open water assemblage was characterized by high biomass and dominated by *Cymatocylis,* the largest taxon. All taxa exhibited maximum concentrations in the upper 50 m of the water column. Both krill and salps grazed upon the *Cymatocylis* and *Codonellopsis* without preference in both the ice covered and open water regimes. (Auth.)

B-45847
Cooper, J., Crafford, J.E., Hecht, T., **Introduction and extinction of brown trout *(Salmo trutta L.)* in an impoverished subantarctic stream,** *Antarctic science,* Mar. 1992 4(1), p.9-14, Refs. p.13-14.

Brown trout were introduced to the Van den Boogaard River on Marion I. in 1964, and a small population became established. The last individual was seen in 1984, and the species is now considered to be extinct on the island. Their diet was exclusively allochthonous, with snails and spiders predominating. Ages estimated at six to eleven years showed that spawning must have occurred since the original introduction. Since the Van den Boogaard River enters the sea via a waterfall, it is postulated that trout were not able to practice an anadromous life-style, and that this, as well as other factors connected with the impoverished nature of the stream, led to dwarfing of the resident population. No further introductions of alien fish to Marion I. should be contemplated. (Auth.)

B-45848
Hunt, G.L., Jr., **Changes in seabird species abundance near South Georgia during a period of rapid change in sea surface temperature,** *Antarctic science,* Mar. 1992 4(1), p.15-22, Refs. p.21-22.

During a 3 month research cruise near South Georgia, sea surface temperature (SST) increased from 2 to over 4 C. Satellite derived SST show that this corresponded to a rapid southward and eastward shift of isotherms in the northern Scotia Sea, which could have resulted from changes in the wind field. At the same time, observation from the ship of seabirds close to the island indicated changes in the abundance of some non- resident species, whereas resident breeders from South Georgia, such as black-browed albatrosses *(Diomedea melanophris)* and prions *(Pachyptila* spp.) which were foraging locally, were present at consistent density in both halves of the survey. Blue petrels *(Halobaena caerulea)* left the area after breeding, so were associated only with the low water temperatures during the first part of the cruise. In contrast, great shearwaters *(Puffinus gravis)* and soft-plumaged petrels *(Pterodroma mollis)* migrated into the area later in the survey. These birds were almost certainly non-breeders feeding in the warmer water which had moved towards the island. (Auth.)

B-45849
Lizotte, M.P., Sullivan, C.W., **Biochemical composition and photosynthate distribution in sea ice microalgae of McMurdo Sound, Antarctica: evidence for nutrient stress during the spring bloom,** *Antarctic science,* Mar. 1992 4(1), p.23-30, Refs. p.29-30.

The nutrient status of microalgae inhabiting sea ice in McMurdo Sound was evaluated during the peak and decline of the spring bloom in Nov. and Dec. Natural populations of microalgae were analyzed for C, N, chlorophyll *a,* protein, lipid, polysaccharide, and low-molecular-weight carbohydrate content, and for the distribution of C-14-labelled photosynthate into macromolecular fractions. Ratios of N:C and protein to carbohydrate (PR:CHO) were similar to values reported for nutrient-limited phytoplankton. Biochemical ratios and C-14- photosynthate allocation patterns suggest that microalgae from congelation ice habitats may be more nutrient-stressed than those from underlying platelet ice habitats. This evidence suggests that sea ice microalgae are nutrient-stressed during the peak and decline of the spring bloom in McMurdo Sound, which presumably begins when microalgal biomass concentrations and demands for growth reach or exceed the rate of nutrient supply from underlying seawater. (Auth. mod.)

B-45850

Prince, P.A., Wood, A.G., Barton, T., Croxall, J.P., **Satellite tracking of wandering albatrosses *(Diomedea exulans)* in the South Atlantic,** *Antarctic science,* Mar. 1992 4(l), p.31-36, 11 refs.

The movements of two wandering albatrosses, one of each sex, breeding at South Georgia, were tracked using satellite telemetry, particularly to assess whether such birds could be at risk from longline fishing operations in the subtropics. Full details of the performance (number and quality of uplinks) of the Toyocom transmitters are provided, together with data on flight speeds and night and daytime travel by the albatrosses. The female, traced for seventeen days—covering three foraging trips totalling 13,951 km—had a much more northerly distribution than the male, which made two trips to sea during the same period and travelled a minimum distance of 9280 km. On one trip the female frequented the area off Brazil known to be used for longline fisheries. The distributional differences between the sexes support earlier suggestions, based on at-sea observations, that the observed high mortality rates of South Georgian females could be due to a greater likelihood of incidental mortality in longline fishing. These results also show that the presence of females off Brazil can include birds still rearing chicks, rather than simply representing post-breeding dispersal. (Auth.)

B-45851

Seppelt, R.D., Green, T.G.A., Schwarz, A.M.J., Frost, A., **Extreme southern locations for moss sporophytes in Antarctica,** *Antarctic science,* Mar. 1992 4(l), p.37-39, 10 refs.

Abundant immature sporophytes of the moss *Pottia heimii* are reported from the Lower Taylor Valley, McMurdo Dry Valleys and from Cape Chocolate, Victoria Land. These finds extend the reported southern limit for the occurrence of abundant moss sporophytes to 77.9S. (Auth.)

B-45852

Smith, V.R., Steenkamp, M., **Soil nitrogen transformations on a subantarctic island,** *Antarctic science,* Mar. 1992 4(l), p.41-50, 30 refs.

The vascular vegetation of a mire-grassland community on Marion I. takes up c. 158 mg N/sq m/d in summer. Bryophytes take up c. 36 mg N/sq m/d during their peak growth period. Since inputs of N through precipitation and biological fixation are negligible, mineralization of organic N must have supplied the bulk of this N. From changes in peat inorganic N levels and rates of uptake by the vegetation, mean mineralization rates of 178 mg N/sq m/d in summer and 55 mg N/sq m/d in winter are estimated. *In situ* incubation of peat give a maximum mineralization rate of 48 mg N/sq m/d. At this rate the small pool of available N in the upper 25 cm of peat would be depleted by the vascular vegetation in about seven days and bryophytes would deplete the available N pool in the top 25 mm in two days. Hence the rate of N mineralization measured by incubation is much too low to account for the fluctuations in concentrations of inorganic N in the peat and the amounts taken up by the vegetation. This may be due to losses through denitrification or to the fact that soil macroinvertebrates were excluded from the incubation. (Auth.)

B-45853

Zdzitowiecki, K., White, M.G., **Digenean Trematoda infection of inshore fish at South Georgia,** *Antarctic science,* Mar. 1992 4(l), p.51-55, 26 refs.

A sample of 111 fish of 8 species caught in 2 fjords at South Georgia were examined for digenean trematode parasites. The alimentary tracts of all specimens were infected with digeneans. The dominant species was *Elytrophalloides oatesi* (Leiper & Atkinson) which was found in all fish, with a maximum number of 1961 specimens per fish. Other common species were: *Macvicaria pennelli* (Leiper & Atkinson), *Lepidapedon garrardi* (Leiper & Atkinson), *Lecithaster macrocotyle* Szidat & Graefe, *Genolinea bowersi* (Leiper & Atkinson) and *Postmonorchis variabilis* Prudhoe & Bray. Three further species, *Neolebouria antarctica* (Szidat & Graefe), *Discoverytrema markowskii* Gibson and *Gonocerca phycidis* Manter, were rare. Infection of the most commonly caught fish at South Georgia, *Notothenia rossii* Richardson, is compared with that of *N. rossii* at Admiralty Bay. The species composition of common parasites was similar in both areas, but conspicuous differences in the frequency of individual digenean species were found. (Auth.)

B-45854

Hennion, F., Couderc, H., **Cytogenetical study of *Pringlea antiscorbutica* R.Br. and *Ranunculus moseleyi* Hook.f. from the Kerguelen Islands ,** *Antarctic science,* Mar. 1992 4(l), p.57-58, 9 refs.

Pringlea antiscorbutica R.Br. and *Ranunculus moseleyi* Hook.f. are two species endemic to the subantarctic phytogeographical zone of the south Indian Ocean. The first species is the well-known "Kerguelen cabbage", and for this taxonomic anomaly a monospecific genus was created. The only chromosome count available is by Hamel (1951). The second species *R. moseleyi* was first believed to be a strict endemic of the Kerguelen Is., but then apparently was recorded on Crozet and Marion Is. This short note aims to provide the first chromosome count for *R. moseleyi* and idiograms for both species. (Auth. mod.)

B-45861

Scharek, R., **Development of phytoplankton during the late winter/spring transition in the eastern Weddell Sea (Antarctica)** [Die Entwicklung des Phytoplanktons im Östlichen Weddellmeer (Antarktis) beim Übergang vom Spätwinter zum Frühjahr], *Berichte zur Polarforschung,* 1991 No.94, 195p., In German with English summary. Refs. p.181-191.

The distribution and species composition of phyto- and protozooplankton were investigated in relation to the hydrographic and sea ice regimes in the Weddell Sea in late winter. Their growth and development during the winter-spring transition were also studied. Furthermore, the condition of the winter phytoplankton and the role of enhanced light levels in coastal polynyas, intrusion of meltwater and of "seeding" cells into the upper water layers during the transition to the spring situation were evaluated. Investigations were carried out between the beginning of Oct. and mid-Dec., before and during the course of sea ice melting, during the second leg of the Winter Weddell Sea Project (WWSP, 1986) on R.V. *Polarstern.* Two long sections through the pack ice of the eastern Weddell Gyre were conducted during Oct. and Dec. on the way to and from the polynyas along the southeastern coast. Transects perpendicular to the coast were carried out off Drescher Inlet in the coastal current (three before and three during sea ice melting). Before the onset of melting, several stations were also carried out in the very southern coastal polynya regions. The area of investigation can be separated into three zones:

the northern sea ice edge zone, (54.5S-60S), the pack ice girdle of the eastern Weddell Gyre (60-70S), and the polynyas over the coastal current in the southeastern Weddell Sea (70-77S).

B-45862

Brandt, A., **Colonization of the antarctic shelf by the Isopoda (Crustacea, Malacostraca)** [Zur Besiedlungsgeschichte des antarktischen Schelfes am Beispiel der Isopoda (Crustacea, Malacostraca)], *Berichte zur Polarforschung,* 1991 No.98, 240p., In German with English summary. Refs. p.201-240.

On the basis of historical geology of Antarctica, and data from climatology and paleontology, the zoogeographic distribution of Isopoda in the southern oceans is investigated. Questions concerning the origin of this fauna, the history of the settlement of the antarctic shelf, and the phenomena of submergence or emergence of antarctic isopods can be answered for some already well analyzed taxa. Some of the facts known of these faunas include: of the 346 known antarctic species, 302 are endemic to Antarctica; 226 of the 346 settle on the continental shelf; comparisons of antarctic faunas with those of neighboring continents show that 10 species occur in both Antarctica and South Africa; in Australia, 11, and in South America, 34; only one species is bipolar; some species have been found only on the continental shelf, while others occur only in the deep sea; polar submergence is demonstrated for nine families and one suborder, and polar emergence is shown for four families. It seems quite improbable that the late Miocene or Pliocene ice-ages completely erased the antarctic shelf fauna. The high percentage of endemic species, and the data on the zoogeography and phylogeny of (at least) the shelf families Serolidae and Arcturidae, show that even during the Tertiary climatic changes a benthos community must have existed. (Auth. mod.)

B-45864

Kunzmann, A., **Blood physiology and ecological consequences in Weddell Sea fishes (Antarctica),** *Berichte zur Polarforschung,* 1991 No.91, 79p., With German summary. Refs. p.72-78.

The introduction focuses on the gas exchange, a primary function of blood in vertebrates. Since most knowledge on blood functions originates from mammals, important differences between haematology in fishes and mammals are outlined. Extensive studies on environmental adaptations in the respiratory system of fishes are briefly summarized. Emphasis is placed on the sedentary mode of life of fishes and its reflection in various haematological parameters. The remainder of the work expands on this outline and provides details of the blood structure and chemistry, the physical activity and the behavior of these fish, and provides some general conclusions about families and their evolution. (Auth. mod.)

B-45871

Foster, B.A., **Zooplankton comparisons in McMurdo Sound,** *New Zealand antarctic record,* 1991 11(1), p.36-47, 12 refs.

Zooplankton samples were collected from beneath the fast sea-ice in McMurdo Sound in early Nov. 1990 as part of an on-going program to define the nature of the zooplankton of the marine ecosystem for its own worth and for relating to fish feeding studies. Samples from off Scott Base and off Marble Point were similar, and both of these differ from samples off Cape Royds in the abundances of some of the taxa. Minor differences in densities of some taxa occur between years, i.e. 1985 and 1987 data compared with 1990 samples collected off Scott Base. Samples pumped from finite depths (to 20 m) close to the shore revealed no depth stratification of plankton, but some small crustaceans associated with the benthos were taken in samples close to the seabed. (Auth.)

B-45879

Davey, M.C., **Effects of physical factors on the survival and growth of antarctic terrestrial algae,** *British phycological journal,* Dec. 1991 26(4), p.315-325, Refs. p.324-325.

The survival and growth of four genera of cyanobacteria and microalgae isolated from antarctic fellfield soils were investigated. The coccoid chlorophyte *Planktosphaerella* exhibited the highest growth rates under most conditions. Growth rates of the other species were similar to each other, although the diatom *Pinnularia* maintained near-maximum growth rates over a wider range of conditions than the filamentous cyanobacterium *Phormidium* or the filamentous chlorophyte *Zygnema.* Maximum growth of all species occurred at 15-20 C and no growth was observed at 0 C, indicating that there is little adaptation to growth at low temperature. Results are consistent with the observation that the soil flora largely occurs beneath the surface of the soil where photon flux density (PFD) is reduced. All species survived repeated 24 h freeze-thaw cycles, following an initial decline on the first cycle. Survival of desiccation differed markedly among species, from a few hours in *Planktosphaerella* to many weeks in *Phormidium* and *Pinnularia,* and is probably a major factor in the ability of these genera to colonize the fellfield soils. (Auth. mod.)

B-45893

Conover, R.J., Huntley, M., **Copepods in ice-covered seas —distribution, adaptations to seasonally limited food, metabolism, growth patterns and life cycle strategies in polar seas,** *Journal of marine systems,* July 1991 2(1-2), p.1-41, Refs. p.35-41.

In the polar seas, the combination of a shallow, generally stable mixed layer with a close proximity to abundant food make the under-ice zone a suitable nursery for both pelagic and benthic species, an upside-down benthos for opportunistic substrate browsers, and a rich feeding environment for species often considered to be neritic in temperate environments. Where the ice cover is not continuous there may be a retreating ice edge that facilitates the seasonal production of phytoplankton primarily through increased stability from the melt water. Ice edge blooms similarly encourage secondary production by pelagic animals. The rate of growth of arctic or antarctic zooplankton is not so important as assuring a high level of fecundity when maturity comes. Overwintering is probably not a great hardship and diapause may not be a useful strategy, because the environmental temperature is constantly near the freezing point of sea water, and basal metabolism accordingly low. Nonetheless, feeding behavior and metabolic rates have strong seasonal signals. In the absence of other stimuli, light must be involved in the transformation from winter to summer metabolism and vice versa, but the mechanisms still remain obscure. This paper describes the diverse growth and adaptation process of copepod species in polar oceans. (Auth. mod.)

B-45894

Gulliksen, B., Lönne, O.J., **Sea ice macrofauna in the Antarctic and the Arctic,** *Journal of marine systems,* July 1991 2(1-2), p.53-61, 48 refs.

In this paper, sea ice faunal assemblages with invertebrates and fish are recorded both in the Antarctic and the Arctic. Primary structuring factors of the assemblages are age and drift pattern of the ice, hydrography and water currents in the immediate vicinity of the ice, and distance to the benthic habitat. Allochthonous sympagic organisms (temporary occupants of the ice) are recorded both in the Antarctic and the Arctic. They may be pelago-sympagic or bentho-sympagic according to their habitat when not living in the ice. Examples of pelago-sympagic organisms from the Antarctic are the krill *(Euphausia superba)* and the notothenoid fish *Pagothenia borchgrevinki;* examples from the Arctic are the polar cod *(Boreogadus saida)* and copepods *(Calanus glacialis).* (Auth. mod.)

B-45896

Ainley, D.G., **Structure of upper level pelagic food webs in the Antarctic: effect of phytoplankton distribution,** *Journal of marine systems,* July 1991 2(1-2), p.111-122, 33 refs.

In this paper, diet composition and diversity and the diet overlap between species within the seabird community of the Scotia-Weddell Confluence region during spring, autumn and winter are investigated. Seasonal changes in diet characteristics and overlap among species are viewed in the context of changes in prey availability as a function of vertical distribution in the water column. The latter was in turn affected by the location of phytoplankton and associated grazers. When primary productivity was confined to the pack ice during winter, thus bringing grazers and their predators closer to the surface, micronekton were much more vulnerable to avian predators and the latter were able to select prey on the basis of energetic value. As a consequence, the upper food web was much less diffuse than during the other seasons when prey occurred throughout the upper portion of the water column and predators had to be opportunistic. The mobility of micronekton and nekton bring some structure to the upper portion of marine food webs, thereby introducing seasonal variability of trophic relationships within antarctic food webs. (Auth. mod.)

B-45897

Garrison, D.L., Buck, K.R., Gowing, M.M., **Plankton assemblages in the ice edge zone of the Weddell Sea during the austral winter,** *Journal of marine systems,* July 1991 2(1-2), p.123-130, 31 refs.

As part of the Antarctic Marine Ecosystem Research in the Ice Edge Zone (AMERIEZ) program, nano- and microplankton across the ice edge zone during the austral winter were sampled. A variety of microscopical techniques allowed investigation of the composition, trophic mode and biomass of the spectrum of organisms that make up the winter plankton assemblage. Total nano- and microplankton biomass in the upper 100 m of the water column ranged from 0.3 to 0.6 gC/sq m. The biomass composition of plankton assemblages among the stations was relatively uniform throughout the ice edge zone; however, the autotrophic flagellates and dinoflagellates showed significantly higher biomass at the ice edge or in open water relative to ice covered stations. The heterotrophic biomass (protozooplankton) exceeded the biomass of phytoplankton at most stations. This study suggests that winter plankton assemblages were dominated by nanoplankton for both algae and protozoans. The abundance of athecate dinoflagellates, both autotrophic and heterotrophic forms, was unusual and warrants further investigation of the role of these organisms in the antarctic plankton community. Generally low production, and the high abundance of heterotrophic organisms relative to the phytoplankton, suggest that protozooplankton will be important in utilizing winter primary and bacterial production and transferring this production to higher levels of the food web. (Auth. mod.)

B-45898

Gowing, M.M., Garrison, D.L., **Austral winter distributions of large tintinnid and large sarcodinid protozooplankton in the ice-edge zone of the Weddell/Scotia Seas,** *Journal of marine systems,* July 1991 2(1-2), p.131-141, 51 refs.

As part of the Antarctic Marine Ecosystem Research in the Ice Edge Zone (AMERIEZ) project, large (> 50 microns) protozooplankton in the winter ice edge zone of the Scotia/Weddell Seas were sampled. Organisms alive at the time of capture were counted in large volume (60 l) water samples from 5 paired depths in the upper 210 m from 17 stations. Relationships between abundances and environmental factors in ice-covered, ice edge, and open waters were assessed with correlation, cluster, and multidimensional scaling analyses. Abundances of large tintinnids were higher in surface waters under the ice than at the ice edge or in open water. This could result from their feeding on algal cells released from the base of the ice, or it may be a result of higher populations in the outflow of Weddell Sea water. There were no consistent abundance patterns among large sarcodines that could be related to ice cover. It is suggested that the combination of low winter productivity, a dynamic environment, and slower growth rates of these large protozoans may prevent them from responding to local enhanced production with increased abundances in the winter ice edge zone. Furthermore, although there is enhanced productivity at the ice edge, this signal may not reach the protozooplankton groups most abundant in the water layer below the euphotic zone. (Auth. mod.)

B-45900

Niebauer, H.J., **Bio-physical oceanographic interactions at the edge of the arctic ice pack,** *Journal of marine systems,* July 1991 2(1-2), p.209-232, 49 refs.

About 7% of the world ocean is subject to the seasonal advance and retreat of sea ice. Physical processes at ice edges, interacting with biological phenomena, have been observed to promote phytoplankton blooms in both the Arctic (e.g., Bering and Greenland Seas) and the Antarctic. This interaction occurs primarily in spring with the retreating and melting sea ice laying down low-salinity derived stratification that reduces mixing in the photic zone, which encourages a phytoplankton bloom. However, other physical processes such as oceanic eddys and fronts also play a role in enhancing primary productivity at the ice edge. This paper reviews biophysical oceanographic and meteorological interactions observed in both the eastern (Greenland Sea) and western (Bering Sea) Arctic. Comparisons of the physical and biological characteristics for these areas, as well as additional comparisons with the Barents Sea and antarctic waters and other regions of the world ocean are presented. An estimate of some outstanding marginal ice edge research problems is also included. (Auth. mod.)

B-45929

Smetacek, V., **Early spring phytoplankton blooms in ice platelet layers of the southern Weddell Sea, Antarctica,** *Deep-sea research,* Feb. 1992 39(2A), p.153-168, 36 refs.

A dense diatom bloom growing in a shallow stratified layer maintained in position by loose ice platelets was found underlying pack-ice bordering the coastal polynyas of the Weddell Sea ice shelf south of 74S in early spring, well before the onset of seasonal melt. This rich bloom, which covered *ca* 20,000 sq km, contrasted with the barrenness of the entire area between 74S and the northern edge of the pack-ice at 58S; its presence is explained by favorable conditions for accumulation of several decimeter-thick ice platelet layers under pack-ice of the southern shelf. Nutrient exhaustion and mass sinking of diatom chains were observed in this layer. Centric diatoms suspended in interstitial water dominated this bloom, which contrasted strongly with the flora of attached pennates typical of ice platelet layers underlying fast ice. Superblooms have been described previously from the southern Weddell Sea, although their developmental dynamics were not known at the time. Explanations are given for several perplexing features of this superbloom and their significance in enhancing productivity of the Weddell Sea is shown. (Auth.)

B-45931

Ricketts, C., **Assessment of the biological and acoustic characteristics of swarms of antarctic krill,** *Deep-sea research,* Feb. 1992 39(2A), p.359-371, 25 refs.

Measurements on krill from distinct swarms and echo- sounder measurements of the same swarms have been analyzed using multivariate methods. The analysis has addressed the problems of whether krill swarms in a small area may be of a limited number of types, and whether the biological characteristics of the krill could be related to the echo-sounder measurements of the swarm. The main sources of biological variation between krill in different swarms seemed to be related to size and maturity. Krill swarms did not appear to form groups based on biological similarity, and swarms caught in the same haul were as different as swarms caught in different hauls. However, swarms could be divided into groups on the basis of time of day and swarm depth. The biological features (size, maturity, sex ratio and moult stage) of krill in the swarms were not related to echo-sounder observations (horizontal and vertical extent, depth and density of swarms), although some degree of separation between swarms containing large and small krill may be possible if the shape of the swarms is considered. Information on biological characteristics of krill in swarms must still be collected by using nets. (Auth.)

B-45934

McKenna, J.E., Jr., **Trophic relationships within the antarctic demersal fish community of South Georgia Island,** *U.S. National Marine Fisheries Service. Fishery bulletin,* Oct. 1991 89(4), p.643-654, Refs. p.653-654.

Gut contents were analyzed on over 300 stomachs from fish collected during the 1987-88 AMLR ground fish survey of South Georgia. All fish were collected with bottom trawl during the austral summer. Fifteen species of demersal fish (including those of commercial value) were collected. Similarity analysis was applied to the diet information to describe trophic relationships in the South Georgia community. The most abundant species of the South Georgia demersal fish community were classified into three groups, based on summer diets. Krill was found to be the most important prey species to the fish in the South Georgia system. However, based on the analysis of diet overlap, competition appeared to be unimportant in this community during the austral summer. (Auth. mod.)

B-45936

Rivera, P., Astudillo, L.A., Cataldo, F., **Solar radiation protector isolated from antarctic algae *Desmarestia menziesii*** [Protector de radiación solar aislado del alga antártica *Desmarestia menziesii*], *Sociedad Chilena de Química. Boletín,* Dec. 1990 35(4), p.397-399, In Spanish with English summary. 6 refs.

The isolation of 2-hydroxy-4- (octyloxy)benzophenone(octabenzone) from the brown algae *Desmarestia menziesii* is described, and its function as a screen for ultraviolet radiation is reported.

B-45937

Ghebremeskel, K., **Dynamics of plasma nutrients and metabolites in moulting macaroni *(Eudyptes chrysolophus)* and gentoo *(Pygoscelis papua)* penguins,** *Comparative biochemistry and physiology,* Feb. 1992 101A(2), p.301-307, 33 refs.

Dynamics of plasma nutrients and metabolites in moulting macaronis *(Eudyptes chrysolophus)* and gentoo *(Pygoscelis papua)* penguins were studied, showing the following: the late-moult macaroni and gentoo penguins had significantly elevated levels of total lipid and cholesterol, alpha-tocopherol (vitamin E) and alkaline phosphatase activity compared to early-moult birds; the mean concentrations of total protein, albumin, globulin, urate, creatinine, iron, calcium, inorganic phosphate, all-trans retinol and the activity of aspartate transaminase were lower in the late moult groups in both species; mean concentrations of lipid, cholesterol, retinol (vitamin A), alpha-tocopherol (vitamin E), total protein, albumin, globulin, calcium and sodium were higher in the pre-moult than in the early moult macaronis; dietary influence may partly account for the higher nutrient status of the pre-moult birds; both the early and late moult macaronis had raised levels of total lipid, cholesterol, alpha-tocopherol and potassium compared to the corresponding gentoos; total protein, albumin, globulin, sodium and inorganic phosphate concentrations, however, were higher in the later species; and differences in the levels of the plasma nutrients between the early and late moult macaronis, and their counterpart gentoos is due to species-specific variability. (Auth.)

B-45938

Vegas G., E., **Analysis of the antarctic ecological system and its potential for exploitation** [Análisis del sistema ecológico antártico con algunos lineamientos para su explotación], *Boletín de Lima,* Nov. 1987 9(54), p.45-47, In Spanish with English summary. 5 refs.

DLC F3401.B59

An analysis is presented of the effects of excessive exploitation of antarctic marine resources, especially krill, on the balance of the antarctic ecosystems. The interaction between prey and predators is studied on the basis of the Lotka and Volterra model. The relative importance of antarctic birds is briefly considered. The need for international cooperation in the protection of the antarctic environment is emphasized.

B-45939

Tota, B., Acierno, R., Agnisola, C., **Mechanical performance of the isolated and perfused heart of the haemoglobinless antarctic icefish *Chionodraco hamatus* (Lönnberg): effects of loading conditions and temperature,** *Royal Society of London. Philosophical transactions. Series B,* June 29, 1991 332(1264), p.191-198, Refs. p.197-198.

Scaling of heart ventricle mass and body mass in the haemoglobinless antarctic fish *Chionodraco hamatus* Lönnberg shows a relationship similar to those reported for other 'cardiomegalic' icefish *(Chaenocephalus aceratus* and *Channichthys rhinoceratus).* An *in vitro* preparation of the heart of *C. hamatus,* set up to investigate its mechanical performance, showed that the heart is well adapted to working within a range of preloads varying from -0.07 to -0.04 kPa, while it is unable to sustain increases of afterloads higher than 3.0 kPa. As in other teleosts, heart rate is unaffected by changes in preload and afterload. Increase in temperature from 0.5 to 5.8 C affects the heart rate but the stroke volume is not affected. On the whole, the *in vitro* data are similar to those *in vivo* measured in *C. aceratus,* and show that the heart of *C. hamatus* works as a typical volume pump. This is discussed in relation to both the structural constraints related to the cardiac design of this icefish and the biology of this unique vertebrate. (Auth.)

B-45940

Cota, G.F., Legendre, L., Gosselin, M., Ingram, R.G., **Ecology of bottom ice algae: 1. Environmental controls and variability,** *Journal of marine systems,* Aug. 1991 2(3-4), p.257-277, Refs. p.274-277.

Over large ocean areas of the Arctic, Subarctic and Antarctic, which are covered by landfast sea ice during springtime, high concentrations of microalgae have been observed in the interstices of the lower margin of sea ice floes and, in some cases, in a thin layer of surface water immediately under the ice cover or associated with semi-consolidated frazil ice. Ice algal blooms enhance and extend biological production in polar waters by at least 1-3 months. Biomass accumulation of sea ice algal populations ultimately depends upon the duration of the growth season, which is largely a function of climatic and environmental variability. Although the occurrence of prolonged blooms of ice algae at the ice-water interface is a widespread phenomenon, there are important differences between the growth habits and environments of several well-studied sites. In this paper, recent observations from seasonal studies of these sites are compared and contrasted with an emphasis on how the dominant scales of environmental variability influence ice algal populations. (Auth. mod.)

B-45941

Cota, G.F., Smith, R.E.H., **Ecology of bottom ice algae: 2. Dynamics, distributions, and productivity,** *Journal of marine systems,* Aug. 1991 2(3-4), p.279-295, Refs. p.293-295.

Although ice algal dynamics are closely related to irradiance, their dynamics and distributions are influenced by other abiotic and biotic factors. In this paper, environmental factors affecting ice algal abundance and productivity are considered, emphasizing recent results from several well-studied sites. Biomass accumulation, growth rates and productivity have been documented for spring blooms of bottom interstitial and sub- ice assemblages. Current methods of measuring productivity are compared. Results are consistently low but variable, with little systematic difference among them. At present, apparent differences in productivity between bottom ice assemblages in the Arctic and Antarctic, or among different antarctic assemblages, are so confounded by methodological and other sources of variability that no firm differences can be detected. (Auth. mod.)

B-45942

Cota, G.F., Smith, R.E.H., **Ecology of bottom ice algae: 3. Comparative physiology,** *Journal of marine systems,* Aug. 1991 2(3-4), p.297-315, Refs. p.297-315.

In this paper, physiological responses of bottom ice algae to major environmental variables, including temperature, salinity, irradiance and nutrients, have been characterized. Photosynthesis vs. irradiance responses, photosynthate allocation and biochemical composition have been determined for vernal blooms. Ice algae normally exhibit relatively low maximal assimilation numbers (except at subpolar latitudes), but markedly higher photosynthetic efficiencies than planktonic diatoms; large low frequency fluctuations in photosynthetic performance are common during the later phases of blooms. Ice algae have relatively low photoadaptive indices and optimal irradiances, reflecting their lower average growth irradiance. Compared to phytoplankton, photosynthate allocation by ice algae is lower for protein, similar for lipid but higher for polysaccharide and metabolites at the same irradiance. In several respects the physiological behavior of ice algae appears to be fundamentally different from that of phytoplankton. (Auth. mod.)

B-45943

Garrison, D.L., **Overview of the abundance and role of protozooplankton in antarctic waters,** *Journal of marine systems,* Aug. 1991 2(3-4), p.317-331, Refs. p.328-331.

This paper examines the observation that small particulate feeding protozoans appear to have a much greater importance than was previously assumed within the antarctic pelagic system. Past studies indicate that heterotrophic flagellates (dinoflagellates and other heterotrophic nanoplankton) and ciliates (mostly non-loricate oligotrichs) dominate the protozooplankton assemblages in surface waters. The combined biomass of protozooplankton has been reported to comprise from <7 to >75% of the total nano- and microplankton biomass, depending on season and location. Protozoans are also found in sea ice communities where their abundances exceed those typically found in the plankton. Several protozoan species occupy both ice and water habitats, suggesting that seasonally melting sea ice may be the source of ice-edge protozooplankton assemblages. Consumption estimates based on clearance rates, and some preliminary grazing experiments indicate that the protozooplankton should be capable of utilizing a significant proportion of the daily primary and bacterioplankton production. Protozoans may contribute to vertical flux, but present evidence suggests that their contribution will be lower than from other sources. (Auth. mod.)

B-45944

Lancelot, C., Veth, C., Mathot, S., **Modelling ice-edge phytoplankton bloom in the Scotia- Weddell Sea sector of the southern ocean during spring 1988,** *Journal of marine systems,* Aug. 1991 2(3-4), p.333-346, 33 refs.

In this paper, a mathematical model is developed for calculating daily integrated growth of phytoplankton in the Scotia-Weddell Sea sector of the southern ocean from the knowledge of light regime, temperature and vertical structure of the water column. Coupling of this model with a one-dimensional hydrodynamical model, calculating the depth of the wind-mixed layer from meteorological data and ice cover, allowed simulation of the dynamics of phytoplankton development during the ice-retreat period in this sector of the Scotia-Weddell Sea. (Auth. mod.)

B-45945

Codispoti, L.A., Friederich, G.E., Sakamoto, C.M., Gordon, L.I., **Nutrient cycling and primary production in the marine systems of the Arctic and Antarctic,** *Journal of marine systems,* Aug. 1991 2(3-4), p.359-384, Refs. p.381-384.

In this paper, highly localized primary production events in both the Arctic and the Antarctic are examined, with the object of improving the accuracy of their estimation. Arctic primary production rates are being revised upwards because of a better spatial and temporal distribution of incubation experiments and a re-awakening of interest in estimating new production from the distribution of chemical variables. Similarly, recent examination of temporal changes in nitrate concentrations and recognition of the importance of ice-edge blooms has caused antarctic primary productivity to be revised upwards. In both the Arctic and the Antarctic, the ratio of "new" to total primary production is high, and neglect of this fact can lead to an underestimation of the potential that these regions have for influencing global cycles of bioactive chemicals. Because of the differences in geomorphology and stratification, global warming is likely to increase primary production in the Arctic and will probably decrease antarctic primary production. In addition to sharing high ratios of "new" to total primary production, high ammonium concentrations occur in the Arctic and Antarctic. It is possible that these accumulations arise from a strong repression of nitrification at low temperatures. (Auth. mod.)

B-46009

Huntley, M.E., **RACER: an interdisciplinary study of spring bloom dynamics,** *Antarctic journal of the United States,* 1990 25(5), p.126-128, 7 refs.

The research reported in this article was conducted during the RACER-I program, in the 1989-1990 field season. It focused on two principal questions: which biological and physical mechanisms cause the Gerlache Strait region to be highly productive, and how do they function; and are gradients of biomass radiating from the Gerlache Strait due to mass transport from the Strait or to actual gradients in local production? The study area covers approximately 4,000 sq km of the northern Gerlache Strait and southwestern Bransfield Strait.

B-46013

Kocmur, S.F., Vernet, M., Holm-Hansen, O., **RACER: nutrient depletion by phytoplankton during the 1989 austral spring bloom,** *Antarctic journal of the United States,* 1990 25(5), p.138-141, 10 refs.

There was a distinct pattern of nutrient depletion in the mixed layer in the RACER study area, with the greatest depletion occurring at those stations closest to the Antarctic Peninsula, and the least nutrient depletion being found in Bransfield Strait waters (north of Brabant I.) and at the stations around Trinity I. This can be seen from the data in a figure. The depletion of nutrients as noted above was related to increasing stability of the upper water column and concomitant increase of phytoplankton biomass. The relationship between phytoplankton biomass and nutrient concentrations is also illustrated.

B-46014

Holm-Hansen, O., Vernet, M., **RACER: Phytoplankton distribution and rates of primary production during the austral spring bloom,** *Antarctic journal of the United States,* 1990 25(5), p.141-144, 11 refs.

To interpret phytoplankton distribution relative to *in situ* conditions in the upper water column of Gerlache Strait, an instrumented rosette profiling system was used for simultaneous measurement of pertinent physical, chemical and optical conditions in the upper 200 m of the water column. During the first week of observations at station A, in early Oct. of 1989, phytoplankton biomass in the upper 50 m was very low, and there was very little density stratification of the upper water column. The bloom developed rapidly during the first 3 weeks of Nov., with average surface chlorophyll *a* concentrations of 16 mg/cu m between Nov. 13 and 15. Within 1 week the bloom had already started to decline, with average surface chlorophyll *a* concentrations of 12.4 mg/cu m. It is noted that there was much variation in the upper 200 m of the water column in regard to physical, chemical and biological features.

B-46015
Ferrario, M., **RACER: phytoplankton of the northern Gerlache Strait,** *Antarctic journal of the United States,* 1990 25(5), p.145-146, 17 refs.

Three species known to be important components of the spring bloom in Antarctica were common in the RACER samples: *Phaeocystis pouchetii, Thalassiosira tumida* and *Corethron criophylum* Castracane. Preliminary qualitative observations indicate that the flora of the area was dominated by diatoms in the stations with high chlorophyll biomass, while the lower biomass stations were dominated by flagellates. In the northern Gerlache Strait, the presence was also observed of unidentified microflagellates, Volvocales-like cells from the genus *Pyramimonas.*

B-46016
Tupas, L.M., Koike, I., Holm-Hansen, O., **RACER: uptake rates of ammonium and nitrate by phytoplankton populations during the 1989 austral spring bloom,** *Antarctic journal of the United States,* 1990 25(5), p.146-148, 10 refs.

The uptake of ammonium and nitrate was examined to assess nitrogen utilization and mineralization by the planktonic population at different depths within the euphotic zone, as well as by size fractionated portions of the surface planktonic population. Preliminary information on the rates of these processes are presented and the implications of the results on new and recycled production and the regeneration of nitrogen in the RACER area are discussed. Nutrient regeneration in the euphotic zone appears to be of major importance in regard to dynamics of the microbial food web at station A. Additional data at representative stations indicate that the entire RACER area is similarly characterized by relatively high rates of nitrogen cycling.

B-46018
Tien, G., **RACER: microbial processes in the northern Gerlache Strait, 1989-1990,** *Antarctic journal of the United States,* 1990 25(5), p.152-154, 11 refs.

A field program is discussed which included measurements of temporal and spatial variations in microbial biomass and production, as determined by analyses of several water-column parameters (ATP, LPS, bacterial and protozoan cell numbers, heterotrophic activity and dissolved organic nutrients, inorganic carbon and oxygen concentrations). TOTAL ATP increased in the euphotic zone at station A during the 4-week observation period which coincided with the initiation and progression of the spring bloom. At the start of the field study, (Oct. 30, 1989), both TOTAL ATP and NANO ATP concentrations were low and uniform with depth, indicating a well-mixed, pre-bloom condition. During the subsequent 3-week period, however, ATP increased substantially in the surface layer as a dramatic manifestation of the austral spring bloom. The NANO ATP:TOTAL ATP ratio ranged from a mean value of 0.52 during early Nov. to 0.81 at the end of the field experiment, which provides evidence for a shift toward a smaller mean cell size as the spring bloom develops and matures.

B-46020
Bird, D.F., Karl, D.M., **RACER: bacterial growth, abundance, and loss due to protozoan grazing during the 1989 spring bloom,** *Antarctic journal of the United States,* 1990 25(5), p.156-157, 14 refs.

Preliminary data are presented from experiments designed to assess the importance of the transfer of bacterial and algal production, to protozoan consumers, to microbiological dynamics in the Gerlache Strait during early stages of the 1989 austral spring bloom. Microbial community size and composition at each station of the four fast grids were determined directly using epifluorescence microscopy. There was little evidence that grazing had an impact on bacterial biomass and productivity. Incubation experiments indicated that the bacteria probably depend directly on contemporaneous primary production for growth.

B-46021
Huntley, M.E., **RACER: fine-scale and mesoscale zooplankton studies during the spring bloom, 1989,** *Antarctic journal of the United States,* 1990 25(5), p.157-159, 8 refs.

Macrozooplankton studies during the 1989 Research on Antarctic Coastal Ecosystem Rates (RACER) included assessment of water-mass structure based on frequent and comparatively high-resolution hydrographic surveys throughout the northern Gerlache Strait and western Bransfield Strait. Here, some examples are presented of analyses of the vertical distribution of *Calanoides acutus* during the high-resolution time series study at station A, and the comparative night- and daytime abundance and vertical distribution of *Euphausia superba* at three selected stations from each of four successive fast grids. Krill were most abundant in the eastern and northern part of the Gerlache Strait where it joins the Bransfield Strait. They were fewest in the area of strong northward flow in the western Gerlache.

B-46022
Huntley, M.E., Lopez, M.D.G., **RACER: egg production of *Calanoides acutus* during the spring bloom, 1989,** *Antarctic journal of the United States,* 1990 25(5), p.159-161, 6 refs.

Calanoides acutus was collected at 16 stations during the RACER fast grid conducted Nov. 22-24 with a 1-m, 333-micromesh net towed in the upper 100 m. There was great spatial variation in the daily egg production by *C. acutus,* with the highest egg production rates observed in the eastern bays of the Gerlache Strait; rates decreased to the north and to the west. Per unit sea surface area, total egg production is estimated to have been approximately one order of magnitude greater in the Gerlache Strait than in the Bransfield Strait. Circulation patterns observed indicate that water in the mideastern portion of the Gerlache Strait near station A may reside there for at least 2 months, so the large pulse of recruits to the *C. acutus* population not only originates in the Gerlache Strait but probably also develops and grows there.

B-46023
Nordhausen, W., Huntley, M.E., **RACER: Carbon egestion rates of *Euphausia superba*,** *Antarctic journal of the United States,* 1990 25(5), p.161-162, 5 refs.

Studies to determine the individual egestion rate of *Euphausia superba* were performed on board the R/V *Polar Duke* as part of the Research on Antarctic Coastal Ecosystem Rates (RACER) program between Oct. 30 and Nov. 25, 1989, in the Gerlache Strait. Krill was collected from the upper 20 m at station A in vertical tows of a 1-m, 505 micromesh ringnet equipped with a 15-l closed codend. At the end of each experiment, individuals were frozen and later measured for length and for wet and dry weights. The fecal content of elemental carbon, hydrogen, and nitrogen was determined using a Perkin and Elmer 2400 CHN-Elemental Analyzer. The weight specific egestion of carbon calculation is described. A rate of 20 micrograms/mg/dry weight/d is established.

B-46024
Vernet, M., Mitchell, B.G., **RACER: Phaeopigment photooxidation during the spring bloom in northern Gerlache Strait,** *Antarctic journal of the United States,* 1990 25(5), p.162-164, 13 refs.

The study of particles collected with sediment traps in northern Gerlache Strait in Nov. 1989 is discussed. *In situ* photooxidation rates of phaeopigments were lower than previously reported, similar to rates measured for the Arctic. These rates were estimated using the initial slope of phaeopigment loss. Very long incubations did not follow first- order kinetics. These results suggest the existence of "background" phaeopigments not very sensitive to light or fluorescence by a stable compound different from phaeopigments. These hypotheses will be tested by high-performance liquid chromatography analysis of the samples that will allow for estimations of photooxidation rates of individual phaeopigments.

B-46025
Vernet, M., Karl, D.M., **RACER: phytoplankton growth and zooplankton grazing in northern Gerlache Strait estimated from chlorophyll budgets,** *Antarctic journal of the United States,* 1990 25(5), p.164-166, 10 refs.

Results are presented from 3 different sampling periods during the spring bloom in the northern Gerlache Strait, from Nov. 6 to 21, 1989. The sediment traps were deployed 3 times, 1 week apart, for a duration ranging from 1.43 to 2.04 days, at station A in the RACER study area. The development of the spring bloom at station A can be observed from the build-up of chlorophyll *a* and microbial biomass in the mixed layer. Peak concentrations were found during Nov. 19 to 21. Superimposed on the average increasing biomass trend, the system showed great variability, or patchiness, in the distribution of chlorophyll *a* and phaeopigments in the water column.

B-46026
Karl, D.M., Asper, V.L., **RACER: particle flux measurements during the 1989-1990 austral summer,** *Antarctic journal of the United States,* 1990 25(5), p.167-169, 7 refs.

During the 1989-1990 Research on Antarctic Coastal Ecosystem Rates (RACER) field program, a series of sediment-trap experiments was conducted at a station located in the northern portion of the Gerlache Strait. The 5-months continuous record for total mass (dry weight basis) flux at station A revealed a highly variable signal ranging up to a maximum of 1.8 mg/sq m/d in Jan. 1990. It is suggested that the onset and duration of this major Nov. flux event must be extremely rapid and of short duration. Another interesting aspect of these data was the presence of a double peak in mass flux, separated by a period of relatively low particle flux. Two possible explanations for these results are discussed.

B-46027
Huntley, M.E., Escritor, F., **RACER: Mesoscale variation in body size of *Metridia gerlachei* (Copepoda: Calanoida) in the western Bransfield Strait region, austral summer, 1986-1987,** *Antarctic journal of the United States,* 1990 25(5), p.169-171, 15 refs.

During the 1986-1987 RACER program, a study was carried out of the spatial and temporal variability of *Metridia gerlachei* populations in a coastal environment well characterized in terms of other physical, chemical and biological variations. It is concluded that the size of *M. gerlachei* and, by inference, its growth rate, is strongly influenced by ambient food conditions. In contrast to the presumed herbivorous copepod, *Calanoides acutus, M. gerlachei* appears to have a very long reproductive period.

B-46028
Nordhausen, W., Huntley, M.E., **RACER: larval abundance and development rates of *Thysanoessa macrura* G.O. Sars, 1885, during 1986-1987 austral summer,** *Antarctic journal of the United States,* 1990 25(5), p.171-172, 9 refs.

During the RACER investigation in 1986-1987, *Thysanoessa macrura* was found at all stations and at all depths (to 2,700 m). In only 6% of 202 analyzed samples of the slow grid stations were no *T. macrura* found. Larvae of *T. macrura* were consistently more abundant in the upper 100 m; calyptopis and furcilia 1 stages were already abundant in late Dec. The abundance varied over three orders of magnitude, with highest numbers of up to 5,000 individuals per 1,000 cu m in the Gerlache Strait. Lowest abundances were found in the waters of the Drake Passage. *T. macrura* developed from C1 to F6 in about 100 days, which is roughly 20% faster than the development rate in *Euphausia superba.*

B-46032
Marchant, H.J., Davidson, A.T., **Possible impacts of ozone depletion on trophic interactions and biogenic vertical carbon flux in the southern ocean,** International Conference on the Role of the Polar Regions in Global Change, Fairbanks, June 11-15, 1990. Proceedings, Vol.2, Fairbanks, University of Alaska, Dec. 1991, p.397-400, 46 refs.

Recent investigations indicate that antarctic marine phytoplankton are presently UV stressed. The extent to which increasing UV radiation diminishes the ability of phytoplankton to fix CO2 and/or leads to changes in their species composition is equivocal. The colonial stage in the life cycle of the alga *Phaeocystis pouchetii* is one of the major components of the bloom. It has been found that this alga produces extracellular products which are strongly UV-B absorbing. When exposed to increasing levels of UV-B radiation, survival of antarctic colonial *Phaeocystis* was significantly greater than colonies of this species from temperate waters and of the single-celled stage of its life cycle which produces no UV-B-absorbing compounds. *Phaeocystis* is apparently a minor dietary component of antarctic krill, *Euphausia superba,* and its nutritional value to crustacea is reportedly low. Phytoplankton, principally diatoms, together with fecal pellets and molted exoskeletons of grazers contribute most of the particulate carbon flux from the euphotic zone to deep water. If the species composition of antarctic phytoplankton were to shift in favor of *Phaeocystis* at the expense of diatoms, changes to pelagic trophic interactions as well as vertical carbon flux would be likely.

B-46033
Bölter, M., **Microbial mineralization in soils and plant material from Antarctica,** International Conference on the Role of the Polar Regions in Global Change, Fairbanks, June 11-15, 1990. Proceedings, Vol.2, Fairbanks, University of Alaska, Dec. 1991, p.418-422, 13 refs.

The process of microbial mineralization was analyzed in soil samples and plant material, mainly lichens, from the maritime and continental Antarctic to examine effects of temperature and moisture. Three methods were used: total CO2-evolution and biological oxygen demand as a measure of general metabolic activity, and remineralization of C-14 labeled glucose (which may serve as a model for dissolved organic matter) as a measure of the activity of heterotrophic microorganisms. These methods are used as indicators for different fractions of organic material and microbial populations. A comparison of the results of these methods showed that the portion of respired material from C-14 labeled glucose may even exceed the totally metabolized material. These data differ with respect to the parent material, and thus give an indication of its quality and the actual activity of the bacterial population which is considered to be mainly responsible for the turnover and mineralization of dissolved organic matter. (Auth.)

B-46051
Cooper, J., Condy, P.R., **Environmental conservation at the sub-antarctic Prince Edward Islands: a review and recommendations,** *Environmental conservation,* Winter 1988 15(4), p.317-326, 53 refs.

The conservation of antarctic resources, including ecosystems, has been discussed in several international forums, most recently at a symposium entitled 'Scientific Requirements for Antarctic Conservation'. However, conservation matters at sub-antarctic islands, lying outside the Antarctic Treaty region, have generally received less attention at the international level. This review of the status of environmental conservation at the sub-antarctic Prince Edward Is. is intended to serve both to improve environment conservation on and around the islands, and to encourage the production of similar accounts for other sub-antarctic islands and island groups.

B-46054
Calvo, J., Morriconi, E., Rae, G.A., San Roman, N.A., **Evidence of protandry in a subantarctic notothenid, *Eleginops maclovinus* (Cuv. & Val., 1830) from the Beagle Channel, Argentina,** *Journal of fish biology,* Feb. 1992 40(2), p.157-164, 30 refs.

Gonads of *Eleginops maclovinus* (Cuv. & Val., 1830) from the Beagle Channel (Tierra del Fuego, Argentina) were sampled weekly throughout the year and histologically analyzed. Gonads containing solely or mostly testicular tissue were predominant in each length class smaller than 40 cm (80 to 100%). Sex ratio was almost 1:1 in fishes ranging from 41 to 45 cm. Females were dominant in specimens larger than 46 cm (80 to 100%). Four testicular types are described according to maturation degree and absence or presence of female cells, one intermediate gonadal type and one typical ovarian type. It is concluded that this species is a protandrous hermaphrodite. (Auth.)

B-46055
Turkiewicz, M., Kalinowska, H., Galas, E., **Endo-(1,3)*beta*-glucanase and a collagenolytic serine proteinase from *Euphausia superba* Dana (antarctic krill),** *Acta biochimica polonica,* 1991 38(1), p.79-85, 18 refs.

Two digestive enzymes from antarctic krill: an endo-(1,3)-*beta*—glucanase and a serine proteinase which specifically cleaves native collagen, were characterized with regard to their specificity and accommodation to acting at low temperatures. Their presence in the crustacean digestive apparatus proves that krill is an omnivorous organism, and this fact should be considered in estimations of its biomass stock. (Auth.)

B-46056
Karlstam, B., Vincent, J., Johansson, B., Brynö, C., **Simple purification method of squeezed krill for obtaining high levels of hydrolytic enzymes,** *Preparative biochemistry,* 1991 21(4), p.237-256, 18 refs.

The raw material originating from freshly caught antarctic krill was processed by centrifugation and then immediately frozen. This squeezed fluid adjusted to pH 7 was subjected to spontaneous autolysis by storing at different temperatures (20-45 C) and times (10-48 h). The autolyzed material resulted in 3 distinct phases after high-speed centrifugation. The intermediate phase (water-phase) was collected and concentrated by membrane filtration. The high-molecular-weight substances (> 10,000 Daltons) were further purified by ion-exchange chromatography and eluted by a salt gradient. In this manner a bulk enzymatic material from krill can be efficiently obtained for further purification of different hydrolytic enzymes (peptide hydrolases/carbohydrases). (Auth.)

B-46058
Shivaji, S., ***Sphingobacterium antarcticus* sp. nov., a psychrotrophic bacterium from the soils of Schirmacher Oasis, Antarctica,** *International journal of systematic bacteriology,* Jan. 1992 42(1), p.102-106, 42 refs.

Two pure cultures of bacteria isolated from soil samples collected in Schirmacher Hills conformed to the definition of the genus *Sphingobacterium.* They differed from all of the known species of *Sphingobacterium* in being psychrotrophic. The G+C contents of the DNA of the two strains were 39.3 and 40.3 mol%, and DNA-DNA hybridization studies indicated 7% homology with *S. multivorum* and *S. spiritivorum.* The name *Sphingobacterium antarcticus* sp. nov. is proposed for the two antarctic strains. The type strain is 4BY (MTCC 675), and it has been deposited with the Microbial Type Culture Collection, Institute of Microbial Technology, Chandigarh, India. (Auth.)

B-46059
Chown, S.L., **Preliminary analysis of weevil assemblages in the sub-Antarctic: local and regional patterns,** *Journal of biogeography,* Jan. 1992 19(1), p.87-98, 68 refs.

Weevil assemblages were examined on the Prince Edward Is. and compared to those of the other South Indian Ocean Province archipelagos. Patterns found on both Marion and Prince Edward Is. are strikingly similar, despite the different glacial histories (i.e. extent of disturbances) of these islands, and indicate that interspecific competition is an important process underlying assemblage structure in the historically old epilithic biotope, whereas interspecific competition is unimportant in the young vegetated biotope, into which weevils are currently radiating. These findings support previous hypotheses concerning the importance and likelihood of interspecific competition in old, moderately-harsh, predator-free environments. Comparison of all the archipelagos in the province revealed major differences in assemblage structure between the archipelagos which do not support the competition hypothesis, but which are best explained by the varying geological and climatological histories (i.e. extent of disturbance) of the islands. These apparently contradictory findings are reconciled by taking scaling effects into consideration, and highlight the interaction between local and regional processes during the evolution of these assemblages. (Auth.)

B-46069
Green, T.G.A., Seppelt, R.D., Schwarz, A.M.J., **Epilithic lichens on the floor of the Taylor Valley, Ross Dependency, Antarctica,** *Lichenologist,* 1992 24(1), p.57-61, 7 refs.

Two fully epilithic lichen species, *Carbonea capsulata* and *Sarcogyne* sp. were found to occur in a restricted habitat on the floor of the Taylor Valley. The overall climate of the valley has often been regarded as being too dry to support epilithic lichen growth. In this case, the two species are confined to the surfaces of rocks at the point where Canada Stream leaves Canada Lake. This suitable habitat appeared to occur in a band only a few centimeters wide, and at an elevation where the thalli would be wetted but not continuously submerged. Equivalent habitats probably exist elsewhere in the Dry Valley region. (Auth.)

B-46070
Ramaiah, N., Vijayakumar, R., Parulekar, A.H., **Observations on seabirds in the Indian sector of the southern ocean,** *Polar record,* Apr. 1992 28(165), p.113-118, 10 refs.

Seabirds were observed during the southward (Dec. 1989) and homeward (Mar. 1990) voyage of the Ninth Indian Expedition to

Antarctica. Twenty-four species were observed, with high diversity between 40 and 60S. A smaller variety of species, but greater numbers, were observed between latitudes 60 and 70S. The number of species increased in the zone of high primary and secondary production. Many species showed seasonal shifts in distribution. (Auth.)

B-46076

Feller, G., **Purification, characterization, and nucleotide sequence of the thermolabile *alpha*-amylase from the antarctic psychrotroph *Alteromonas haloplanctis* A23,** *Journal of biological chemistry,* Mar. 15, 1992 267(8), p.5217-5221, 31 refs.

N- and C-terminal amino acid sequencing were used to establish the primary structure of the mature *A. haloplanctis alpha*-amylase which is composed of 453 amino acids with a predicted Mr of 49,340 and a pI of 5.5. Three Ca2+ ions are bound per molecule and its activity is modulated by chloride ions. Within the four consensus sequences, Asp-174, Glu-200, and Asp-264 are the proposed catalytic residues. The psychrotrophic *A. haloplanctis alpha*-amylase is characterized by a high amylolytic activity at low temperatures, a reduced apparent optimal temperature, and typical thermodynamic activation parameters. *A. haloplanctis alpha*-amylase has also a low thermal stability, as demonstrated by the temperature effect on both activity and secondary structure. It is suggested that structure flexibility and lower sensitivity of secondary structure to temperature variations in the low temperature range are the main structural adaptations of the psychrotrophic enzyme. The unusual stacking of small amino acids around the catalytic residues is proposed as a factor inducing active site flexibility and concomitant high activity of the enzyme at low temperatures. (Auth.)

B-46079

Suh, H.L., Kim, S., Soh, H.Y., **Distribution and abundance of the antarctic krill *(Euphausia superba):* a brief overview,** *Korean journal of polar research,* Dec. 1991 2(2), p.29-49, In Korean with English summary. Refs. p.45-49.

An estimate of the distribution of krill through studies of seasonal, regional and interannual variation is given. Emphasis is placed on environmental factors influencing the distribution of larvae, juveniles and adults. It is expected that krill has adapted its life cycle to oceanic circulation patterns, including that of sea ice, in a way that maximizes seasonal and regional exploitation of foods. Although krill reproduction is likely to be regulated by environmental conditions, it is still unclear whether interannual variation in distribution and abundance is due to redistribution of krill by physical factors or mass mortality. Reports by divers strongly indicate that sea ice not only provides a substrate to ice-algae but is a refuge for krill. The stock size and recruitment of krill seem to be affected by interannual variations of seasonal ice cover. Also, annually 400-500 thousand metric tonnes of krill are caught in the Antarctic, especially in the Atlantic sector. (Auth. mod.)

B-46080

Chung, H., Yang, J.S., Chung, C.S., **Seawater properties and macroalgal growth in littoral zone of Barton Peninsula, King George Island, Antarctica,** *Korean journal of polar research,* Dec. 1991 2(2), p.51-60, In Korean with English summary. 21 refs.

Growth patterns of macroalgae were investigated with seawater properties (temperature, salinity, and nutrients) from 5 littoral stations at Barton Peninsula during Jan. 1990. Seawater composition in tidepools was so varied that temperature in a station with poor water circulation increased by 10 C (2 C in open-sea), and concentrations of nutrients in a station where freshwater soaked through the substrata were twice as high as those in the open sea. Between macroalgal communities of the tidepools there was a wide difference of biomass (296.6-999.1 mg/sq m) and species composition. Also, populations of *Leptosomia simplex* (Rhodymeniaceae), a dominant species in antarctic regions, showed a morphological difference characteristically. Compared with a population of 2 m depth in open-sea (control), one population influenced by high water temperature grew rapidly, with elongated shape. Another population in freshwater grew slowly, with an almost oval shape. (Auth. mod.)

B-46081

Ahn, I.Y., Kang, Y.C., **Preliminary study on the macrobenthic community of Maxwell Bay, South Shetland Islands, Antarctica,** *Korean journal of polar research,* Dec. 1991 2(2), p.61-71, In Korean with English summary. 16 refs.

Macrobenthic faunas were grab-sampled from 11 stations in Maxwell Bay on Feb. 4-6, 1989. Substrate type is varied, ranging from mud to gravelly muddy sand. Biomass ranges from 0.3 to 154 g wet wt per 0.1 sq m. The highest biomass occurred in a muddy bottom on the bed slope at a depth of 342 m, and the lowest in anoxic muddy bottom of the central deep basin (400-500 m). Polychaetes are the most abundant faunal group, comprising 68% of the total biomass. Echinoderms are the next commonly occurring group, making up 22% of the total biomass. Bivalves comprise 5% of the samples in numbers, but form only 1.4% of the total biomass due to their small body sizes. Species composition seems to be related to the sediment type. In muddy bottom the deposit-feeders such as the tube-building polychaete *Maldane sarsi antarctica* are well represented. On the other hand, in the sandy bottom of Bransfield Strait benthic fauna is more diverse, although only a few individuals were sampled for each of the majority of the species. The large polychaete species *Pista spinifera* and *Neoamphitrite affinis antarctica,* the mobile epifauna such as decapods, amphipods, isopods and pycnogonids, the deposit-feeding holothuroids, and the suspension-feeding cirripedes occur in sandy bottom. (Auth.)

B-46090

Benassi, G., Naldi, M., McKenzie, K.G., **Preliminary research on species distribution of planktonic ostracods (Halocyprididae) in the Ross Sea, Antarctica,** *Journal of crustacean biology,* Feb. 1992 12(1), p.68-78, Refs. p.77-78.

This paper reports the results of preliminary research on planktonic Ostracoda collected in the Ross Sea in 1987-1988. Four species were identified (the highest density and the relative abundance are reported in parentheses): *Alacia belgicae* (4.00 ind/cu m, 82.69%), *Metaconchoecia isocheira* (1.30 ind/cu m, 16.65%), *Alacia hettacra* (0.13 ind/cu m, 0.61%), and *Metaconchoecia skogsbergi* (0.07 ind/cu m, 0.05%). Some juvenile stages were tentatively identified as *Paraconchoecia* cf. *brachyaskos.* In almost all the stations the dominant species was *A. belgicae,* which seems to be a true antarctic endemic species. A positive correlation ($P<0.0001$) was found between ostracod density and sampling layer depth. At most stations, densities were higher in intermediate and deep layers, where ostracods sometimes even assumed the role of the dominant planktonic component in terms of numerical importance. The distribution pattern by depth seems consistent with the detritivorous and carnivorous role of Ostracoda in the trophic structure of the Ross Sea zooplankton community. (Auth. mod.)

B-46099

Rau, G.H., Hopkins, T.L., Torres, J.J., **N-15/N-14 and C-13/C-12 in Weddell Sea vertebrates: implications for feeding diversity,** *Marine ecology progress series,* Oct. 1991 77(1), p.1-6, 33 refs.

Biomass*delta*C-13, *delta*N-15, and C/N were measured for each of 29 taxa of pelagic invertebrates sampled from the Weddell Sea in Mar. 1986. The *delta*C-13 values of these animals ranged from -33.2 to -23.9 per mill, and a significant negative logarithmic relationship was observed between these values and biomass, C/N. This implies that the relative proportion of carbon-rich C-13 depleted lipid in these animals significantly influenced the *delta*C-13 of their bulk biomass. No such relationship with C/N is evident with respect to biomass *delta*N-15, where values ranged from -1.2 to +7.3 per mill. This spread of values reflects a wide diversity of food sources and trophic positions among the species analyzed. Isotopic abundances within krill *Euphausia superba* varied with individual length, apparently reflecting dietary changes during growth. Isotope values within *E. superba* from the Weddell Sea overlap those of krill from other southern ocean locations in the Scotia Sea/Drake Passage, the Ross Sea, and Prydz Bay. (Auth.)

B-46101

Dearborn, J.H., Edwards, K.C., Fratt, D.B., **Diet, feeding behavior, and surface morphology of the multi-armed antarctic sea star *Labidiaster annulatus* (Echinodermata:Asteroidea),** *Marine ecology progress series,* Oct. 31, 1991 77(1), p.65-84, 54 refs.

Labidiaster annulatus is a large, multi-armed sea star common in moderate depths along the Antarctic Peninsula and off the islands of the Scotia Arc. Analyses by frequency of occurrence and several volumetric methods of stomach contents from 194 individuals from South Georgia, the South Sandwich Is., and the Antarctic Peninsula show *L. annulatus* to be an active and opportunistic predator and scavenger on prey from at least 10 phyla. Most common prey are euphausiids and amphipods, which are caught initially by large, crossed, toothed pedicellariae arranged in wreaths on annuli along the arms and subsequently retained and passed to the oral surface and along the ambulacral groove to the mouth by the action of flexible arms and tube feet. *L. annulatus* obtains food, including actively-swimming crustaceans and small fish, directly from the water column, and to a lesser degree from within and on the substrate. Patterns of surface ciliation suggest that no methods of feeding involving cilia are utilized. Differences in the size and function of crossed pedicellariae, sources and types of prey and methods of prey capture now suggest that *L. annulatus* is not an ecological equivalent of *Pycnopodia helianthoides* from western North America. (Auth.)

B-46112

Battaglia, B., ed, Bisol, P.M., ed, Varotto, V., ed, **Proceedings of the 1st Meeting on Biology in Antarctica, Rome, Italy, CNR, June 22-23, 1989** [Atti del Primo Convegno di Biologia Antartica, Roma, CNR, 22-23 giugno, 1989], Padova, Edizioni Universitarie Patavine, 1990, 408p., In Italian with English summaries. Refs. passim. For individual papers see B-46113 through B-46134 and E-46135.

This volume represents the first coordinated contribution of Italian biologists to the Programma Nazionale di Ricerche in Antartide (National Program of Antarctic Research). It contains a collection of papers presented at a meeting held in Rome, Italy, June 22-23, 1989. The biological investigations carried out for the most part at Terra Nova Bay, and in laboratories in Italy on materials collected by the expeditioners, are grouped into the following categories: flora, fauna, and biogeography; evolutionary biology; physiological, biochemical and molecular mechanisms of adaptation; and ecology. The sequence of contributions presented in this volume reflects this order.

B-46113

Nimis, P.L., **State of the art of lichenology in Antarctica** [Lo stato delle conoscenze lichenologiche sul continente antartico], Atti del Primo Convegno di Biologia Antartica, Roma, CNR, 22-23 giugno, 1989 (Meeting on Biology in Antarctica, 1st, Rome, Italy, CNR, June 22-23, 1989. Proceedings). Edited by B. Battaglia, P.M. Bisol and V. Varotto, Padova, Edizioni Universitarie Patavine, 1990, p.5-54, In Italian with English summary. Refs. p.48-54.

In reviewing the history of the research on lichens in Antarctica, it is pointed out that the percentage of bipolar or wide ranging species seems to be much higher than initially supposed, and the degree of endemism appears to be correspondingly much lower. The studies dealing with lichen vegetation in Antarctica are described as following two main methodological approaches: according to physiognomical features, or on the basis of floristic lists. In the field of antarctic lichen ecology, autoecological studies are considered to be the most largely followed. It is noted that several studies analyze microclimatic conditions, the response of lichens to several ecological factors, and in particular the photosynthetic activity of selected species, chiefly of macrolichens. (Auth. mod.)

B-46114

Onofri, S., **Soil mycology** [Micologia del suolo], Atti del Primo Convegno di Biologia Antartica, Roma, CNR, 22-23 giugno, 1989 (Meeting on Biology in Antarctica, 1st, Rome, Italy, CNR, June 22-23, 1989. Proceedings). Edited by B. Battaglia, P.M. Bisol and V. Varotto, Padova, Edizioni Universitarie Patavine, 1990, p.55-65, In Italian with English summary. 22 refs.

The aim of this study is to define the mycoflora of Victoria Land and the possible associations with the bryophytic flora, and to investigate the temperature requirements and ecological role of the fungal species and the rate of organic matter degradation. The presence of microbiological life in environments that are not colonized by primary producers, like mosses and lichens, is also investigated. Relations between microfungi and their media are analyzed by SEM. Isolated strains are lyophilizated and stored. Morphological and ecological features of the fungal species are reported. They belong to three classes in the Ascomycotina and two in the Deuteromycotina. Some species, such as *Byssochlamys nivea* and *Polycoccum* sp. and *Acremonium charticola* and *Phoma* spp. seem to be new records for continental Antarctica. Others, such as *Arthrobotrys* sp., seem to be new species. On the basis of their features, most of the recorded species can be considered stress-and disturbance tolerant. (Auth. mod.)

B-46115

Montemartini Corte, A., **Fungi of aquatic environments** [Funghi di ambienti acquatici], Atti del Primo Convegno di Biologia Antartica, Roma, CNR, 22-23 giugno, 1989 (Meeting on Biology in Antarctica, 1st, Rome, Italy, CNR, June 22-23, 1989. Proceedings). Edited by B. Battaglia, P.M. Bisol and V. Varotto, Padova, Edizioni Universitarie Patavine, 1990, p.67-76, In Italian with English summary. 33 refs.

The presence of fungi in intertidal waters has been investigated by means of short immersions of wooden baits. The entities that have been found are not marine fungi, but for the most part are species already recorded in cold environments; however, *Paecilomyces farinosus, Ulocladium consortiale* and the cosmopolitan species *Penicillium brevicompactum* and *Chaetomium cochlioides* are reported for the first time. Also the few fungi occurring in the mud of antarctic ponds have been researched with the dilution plate technique. Ascomycetes like *Thelebolus* sp., *Chaetomium funicolum, C. spirale* and some picnidial forms have been observed, as well as Deuteromycetes, already reported in Antarctica and in Alaska. *Thelebolus,* already reported in Antarctica, is interesting for its controversial systematic position, for the abundance of its colonies and their polymorphism. By means of single spore cultures it has been verified that this species is homothallic and that the ascomata derived from single spores often have looser walls and mature earlier than the original strain. (Auth.)

B-46116
Del Frate, G., Caretta, G., **Fungi isolated from antarctic material** [Funghi isolati da materiale antartico], Atti del Primo Convegno di Biologia Antartica, Roma, CNR, 22-23 giugno, 1989 (Meeting on Biology in Antarctica, 1st, Rome, Italy, CNR, June 22-23, 1989. Proceedings). Edited by B. Battaglia, P.M. Bisol and V. Varotto, Padova, Edizioni Universitarie Patavine, 1990, p.77-80, In Italian with English summary.

An analysis has been made of fungi isolated from soil, penguin, skua and petrel dung and bird feathers in Victoria Land. The fungi most commonly isolated were the keratinophilic *Chrysosporium verrucosum* and *Geomyces pannorum* var. *pannorum; Phoma herbarum* was common and *Thelebolus microsporus* was recorded. A variety of filamentous fungi and yeasts were also encountered in soil, dung and bird feather samples in different localities. (Auth.)

B-46117
Andreoli, C., Tolomio, C., Dalla Vecchia, F., Rascio, N., **Microalgae collected in the Ross Sea in 1988-1989** [Notizie su microalghe raccolte in occasione della spedizione antartica 1988/89 nel Mare di Ross], Atti del Primo Convegno di Biologia Antartica, Roma, CNR, 22-23 giugno, 1989 (Meeting on Biology in Antarctica, 1st, Rome, Italy, CNR, June 22-23, 1989. Proceedings). Edited by B. Battaglia, P.M. Bisol and V. Varotto, Padova, Edizioni Universitarie Patavine, 1990, p.81-85, In Italian with English summary. 3 refs.

Some preliminary information is presented on both the composition and abundance of phytoplankton of antarctic waters, obtained by analysis of samples collected from the sea near the Terra Nova Bay Station. In particular, the quite important role of the smallest fraction (i.e. picoplankton and small flagellata) has been shown. (Auth.)

B-46118
Argano, R., Carchini, G., **Faunistic collections from the Terra Nova Bay Station area** [Raccolte faunistiche nell'area della base italiana a Terra Nova Bay (Antartide, Victoria Land)], Atti del Primo Convegno di Biologia Antartica, Roma, CNR, 22-23 giugno, 1989 (Meeting on Biology in Antarctica, 1st, Rome, Italy, CNR, June 22-23, 1989. Proceedings). Edited by B. Battaglia, P.M. Bisol and V. Varotto, Padova, Edizioni Universitarie Patavine, 1990, p.87-109, In Italian with English summary.

About 150 land and freshwater samples were collected in 33 localities of Victoria Land, at up to 2700 m altitude. Marine samples were collected in the immediate vicinity of the Terra Nova Bay Station, in the area between Cape Russell and Gerlache Inlet. The inland water habitats display a fair uniformity: the communities are formed by Mastigophora, Ciliatea, Rotifera, Tardigrada, Nematoda and Turbellaria. A great variability in conductivity, dissolved ions and temperature is found among various bodies of water, even among those topographically near one another. In the land habitats, the collections confirm the presence of Collembola, Protostigmata, Cryptostigmata, Nematoda, Rotifera, Tardigrada and Protozoa. Marine samples include the Copepoda, Nematoda, Acarina, Isopoda, Amphipoda, Anellida, Turbellaria and Natantia. Tethys Bay contains abundant Spongiae, Polichaetae, Ostracoda and Isopoda.

B-46119
Vinciguerra, M.T., Binda, M.G., Pilato, G., **Faunistic research in Antarctica: first data on terrestrial and fresh water nematodes and tardigrades** [Ricerche faunistiche in Antartide: Primi dati sui Nematodi e i Tardigradi terrestri a d'acqua dolce], Atti del Primo Convegno di Biologia Antartica, Roma, CNR, 22-23 giugno, 1989 (Meeting on Biology in Antarctica, 1st, Rome, Italy, CNR, June 22-23, 1989. Proceedings). Edited by B. Battaglia, P.M. Bisol and V. Varotto, Padova, Edizioni Universitarie Patavine, 1990, p.111-113, In Italian with English summary. 4 refs.

Up to now 17 species of nematodes, belonging to 12 different genera, have been reported from Antarctica; among them 10 species and two genera are exclusive to this area. In the samples of mosses and fresh water collected during the Italian expedition to Antarctica only 5 species of nematodes have been found; *Scottnema lindsayi* and *Panagrolaimus davidi* deserve a redescription and taxonomic reconsideration. A male of *Plectus acuminatus* was found which shows some characteristics different from those typical of the species. The species of tardigrades known so far in Antarctica are 25, including 5 exclusive to this continent and 20 found also in some subantarctic area. The few samples collected during the Italian expedition, examined so far, yielded 5 species, one of which, *Macrobiotus polaris,* had not been found since 1910; one species still under examination is new to science. (Auth. mod.)

B-46120
De Nicola, M., Guarino, S.M., Piraino, S., Sandulli, R., **Antarctic benthic fauna: amphipods and harpacticoid copepods** [Studi della fauna bentonica antartica: Anfipodi e Copepodi arpacticoidi], Atti del Primo Convegno di Biologia Antartica, Roma, CNR, 22-23 giugno, 1989 (Meeting on Biology in Antarctica, 1st, Rome, Italy, CNR, June 22-23, 1989. Proceedings). Edited by B. Battaglia, P.M. Bisol and V. Varotto, Padova, Edizioni Universitarie Patavine, 1990, p.115-125, In Italian with English summary. 8 refs.

Morphological studies on an antarctic crustacean amphipod and on some meiobenthic harpacticoid copepods were carried out through Scanning Electron Microscopy (SEM) and x-ray microanalysis. Individuals of the amphipod species *Paramoera walkeri* were collected during the Italian expedition of 1987-1988; the copepods were collected in 1988-89. The SEM samples show the fine structures of the amphipod and of the harpacticoids. Detailed descriptions are given. (Auth.)

B-46121
La Greca, M., **Subantarctic faunistic and biogeographic research, 1987-1988** [Le ricerche faunistico-biogeografiche in Subantartide. Resultati preliminari della campagna 1987-88], Atti del Primo Convegno di Biologia Antartica, Roma, CNR, 22-23 giugno, 1989 (Meeting on Biology in Antarctica, 1st, Rome, Italy, CNR, June 22-23, 1989. Proceedings). Edited by B. Battaglia, P.M. Bisol and V. Varotto, Padova, Edizioni Universitarie Patavine, 1990, p.127-156, In Italian with English summary. Refs. passim.

A small portion of this report is dedicated to the 25 species of Tardigrada identified in Antarctica. It is concluded that 5 of these are endemic to Antarctica, while the remaining 20 can also be found in the Subantarctic.

B-46122
Battaglia, B., Bisol, P.M., Patarnello, T., Varotto, V., **Ecological and evolutionary genetics of antarctic and subantarctic marine crustaceans** [Ricerche di biologia evoluzionistica in aree antartiche e subantartiche: meccanismi genetici di adattamento e speciazione], Atti del Primo Convegno di Biologia Antartica, Roma, CNR, 22-23 giugno, 1989 (Meeting on Biology in Antarctica, 1st, Rome, Italy, CNR, June 22-23, 1989. Proceedings). Edited by B. Battaglia, P.M. Bisol and V. Varotto, Padova, Edizioni Universitarie Patavine, 1990, p.157-172, In Italian with English summary. 10 refs.

Samples from the Ross Sea of *Paramoera walkeri,* an important component of the fast ice community, have been analyzed genetically by means of electrophoretic techniques. The genetic structure of populations collected from sites differing also ecologically appeared remarkably homogeneous. Common features were the similar gene frequencies and the low values of observed genetic polymorphism. Of 4 subantarctic species, *(Paramoera parva, P. fissicauda, P. brachyurus,* and *P. austrina),* the first three exhibited values of genetic variability as low as those found in the antarctic species, whereas *P. austrina* is much more polymorphic. Estimates of genetic distance suggest the hypothesis of two evolutionary pathways from a common ancestor: the first, represented by *P. austrina* and *P. brachyurus;* the second by the three other species. Similar investigations have been carried out in three species of Euphausiids *(Euphausia superba, E. crystallorophias, Thysanoessa macrura)* collected in the Weddell Sea. The analysis of enzyme polymorphisms reveals, in all 3 species, some common traits, such as the high level of variability for the loci PGI, PGM and MPI, and the conspicuous heterozygote deficiency in the majority of the populations sampled. This, together with some differences in gene frequencies, seems to reflect a tendency of the populations to undergo fragmentation. (Auth. mod.)

B-46123
Lazzaretto, I., Libertini, A., **Karyology of some antarctic marine invertebrates** [Ricerche cariologiche su alcuni invertebrati marini della regione antartica. Dati preliminari], Atti del Primo Convegno di Biologia Antartica, Roma, CNR, 22-23 giugno, 1989 (Meeting on Biology in Antarctica, 1st, Rome, Italy, CNR, June 22-23, 1989. Proceedings). Edited by B. Battaglia, P.M. Bisol and V. Varotto, Padova, Edizioni Universitarie Patavine, 1990, p.173-176, In Italian with English summary. 18 refs.

The antarctic marine environment, characterized by an exceptional variety of benthic species, represents an ideal subject for evolutionary studies where peculiar processes of speciation may be revealed. On the basis of a karyological study involving 4 subantarctic populations of harpacticoid copepods, two new species of the genera *Tisbe* and *Tigriopus* have been identified, and some hypotheses on their karyotypical evolution are suggested. (Auth.)

B-46124
Bullini, L., **Genetic structure of endoparasitic nematodes and their hosts; adaptive processes** [Ricerche sulla struttura genetica di nematodi endoparassiti della regione antartica e di loro ospiti: aspetti adattativi e meccanismi di differenziamento genetico e di speciazione], Atti del Primo Convegno di Biologia Antartica, Roma, CNR, 22-23 giugno, 1989 (Meeting on Biology in Antarctica, 1st, Rome, Italy, CNR, June 22-23, 1989. Proceedings). Edited by B. Battaglia, P.M. Bisol and V. Varotto, Padova, Edizioni Universitarie Patavine, 1990, p.177-198, In Italian with English summary. 17 refs.

The genetic structure of endoparasitic nematodes of the antarctic and subantarctic regions, and of their intermediate and definitive hosts, was analyzed by means of multilocus electrophoresis. The main topics investigated were the following: the adaptive patterns, with particular emphasis on the eco-genetic strategies of host-parasite interactions; the amount of genetic variability at the population level among taxa; the mechanisms of speciation and co-speciation, and particularly the comparative study of sibling species; the biochemical taxonomy of critical groups; and the genetic comparison between antarctic and boreal populations considered on a morphological basis to be conspecific. Specimens morphologically assigned to *Contracaecum osculatum* (245) and *C. radiatum* (62) were recovered at the larval stage from the fish *Chionodraco hamatus* (Ross Bay) and from the seal *Leptonychotes weddelli* (Weddell Sea). Data confirm the positive correlation between genetic variability and environmental heterogeneity encountered by the endoparasitic ascaridoids, suggesting a major role of natural selection in this phenomenon, while random drift seems to be negligible. Another set of data concerning the genetic structure of the antarctic fish *C. hamatus* is discussed. (Auth. mod.)

B-46125
Morescalchi, A., **Cytogenetics of notothenioid fishes** [Dati preliminari sulla citogenetica dei pesci Nototenioidei], Atti del Primo Convegno di Biologia Antartica, Roma, CNR, 22-23 giugno, 1989 (Meeting on Biology in Antarctica, 1st, Rome, Italy, CNR, June 22-23, 1989. Proceedings). Edited by B. Battaglia, P.M. Bisol and V. Varotto, Padova, Edizioni Universitarie Patavine, 1990, p.199-210, In Italian with English summary. 12 refs.

Karyotype morphology, genome size and chromosome localization of peculiar gene fractions, such as heterochromatin and NOR regions, have been studied in 3 species of Channictiids and 4 species of Nototheniids. *C. antarcticus* and 3 females of *C. hamatus* show 48 chromosomes; 2 males of *C. hamatus* show heteromorphism in the largest biarmed pair and one acrocentric less than the females. It is suggested that this species has multiple sex chromosomes with a X1YX2 system in the male and a X1X1X2X2 system in the female. *P. macropterus* (only one male studied) has 47 chromosomes with a large monosomic metacentric; one arm of many biarmed elements is heterochromatic. The karyological relationships of 3 of the studied Nototheniids *(P. bernacchii,* 2n=48; *P. hansoni* 2n=46; *T. newnesi,* 2n=45 with a large monosomic metacentric) appear of Robertsonian type. *T. centronotus* (2n=32) seems to be the most differentiated species from this viewpoint. (Auth. mod.)

B-46126
Luporini, P., **Interstitial antarctic microfauna: morphology and biology of some ciliates from the Ross Sea** [Microfauna interstiziale antartica: morfologia e biologia di alcuni ciliati del mare di Ross], Atti del Primo Convegno di Biologia Antartica, Roma, CNR, 22-23 giugno, 1989 (Meeting on Biology in Antarctica, 1st, Rome, Italy, CNR, June 22-23, 1989. Proceedings). Edited by B. Battaglia, P.M. Bisol and V. Varotto, Padova, Edizioni Universitarie Patavine, 1990, p.211-229, In Italian with English summary. 16 refs.

Samples of interstitial microfauna were collected from different areas of the Ross Sea from Dec. 1988 to Feb. 1989. The following genera were identified: *Aspidisca, Cyclidium, Diophrys, Epiclintes, Euplotes, Paraurostyla, Pleuronema, Strombidium, Uronema,* and *Uronychia.* Particular attention was focused on species of *Euplotes.* Morphological observations carried out on these strains have revealed that they belong to at least 3 new species which have been named *E. focardii, E. nobilii,* and *E. euryhalinus.* They fall in the group of *Euplotes* species characterized by a dorsal argyrome of the "double" type and a set of 10 fronto-ventral cirri. In *E. focardii* it was possible to isolate 2 strains, TN1 and TN14, which form mating pairs when mixed together. The biochemical analysis of cell filtrate recovered from strain TN1 of *E. focardii* revealed the presence of a polypeptide, which is constitutively secreted by the cells and shows a mating pheromone-like activity. A particularly unusual organization was found for the beta-tubulin gene, which is represented by 3 macronuclear isoforms of 1,600; 1,900; and 2,150 bp, respectively. Since all these isoforms were shown to be co-expressed, it is suggested that the special organization of *E. focardii* beta-tubulin gene reflects a specific adaptation of the organism to life at a low temperature which imposes a low rate of mRNA transcription. (Auth. mod.)

B-46127

Camardella, L., **Studies on the molecular bases of adaptation to low temperatures in antarctic teleostea: haemoglobins and enzymes** [Studi sulle basi molecolari dell'adattamento dei teleostei antartici alle basse temperature ambientali: emoglobine ed enzimi], Atti del Primo Convegno di Biologia Antartica, Roma, CNR, 22-23 giugno, 1989 (Meeting on Biology in Antarctica, 1st, Rome, Italy, CNR, June 22-23, 1989. Proceedings). Edited by B. Battaglia, P.M. Bisol and V. Varotto, Padova, Edizioni Universitarie Patavine, 1990, p.231-273, In Italian with English summary. Refs. p.270-273.

During 8 austral summer seasons, specimens of 24 species of fishes of 6 antarctic families were obtained from the Antarctic Peninsula and the Ross Sea. The electrophoretic examination of the hemolysates revealed a single major hemoglobin (and often a second minor component) in all species (with one exception) of the largely endemic suborder Notothenioidei. In contrast, species of the non-endemic suborder Zoarcoidei, similarly to fishes of temperate waters, showed a higher multiplicity (4-5 major components). The hemoglobins of 17 species were purified by ion-exchange chromatography, then characterized structurally and functionally. Pure protein was obtained in crystalline form in 10 cases. In view of the relatively constant physico-chemical features of the antarctic habitat, it is not surprising that antarctic fishes do not have more than one hemoglobin. Zoarcoidei, which can be found at all latitudes, do not follow this trend; the experimental evidence suggests separate evolutionary pathways following suborder divergence. It is concluded that, if cold adaptation is indeed linked to profound variations in the metabolic rate, some clue on the molecular basis of cold adaptation may thus come through studies of structure and function of enzymes controlling key metabolic pathways for organisms living under totally different conditions. (Auth. mod.)

B-46128

Albergoni, V., **Physiological and biochemical responses to heavy metal contamination in antarctic organisms and adaptation to dissolved oxygen increases** [Studio degli aspetti fisiologici e tossicologici della contaminazione da metalli in organismi antartici, delle risposte fisiologiche e biochimiche a metalli pesanti e degli aspetti fisiologici e biochimichi del''adattamento all'aumento di ossigeno disciolto], Atti del Primo Convegno di Biologia Antartica, Roma, CNR, 22-23 giugno, 1989 (Meeting on Biology in Antarctica, 1st, Rome, Italy, CNR, June 22-23, 1989. Proceedings). Edited by B. Battaglia, P.M. Bisol and V. Varotto, Padova, Edizioni Universitarie Patavine, 1990, p.275-297, In Italian with English summary. Refs. passim.

Aspects of the fine structure of *Uronema marinum*, the phenomenon of conjugation, the effects of cadmium exposure and data related to some species of Protozoa Flagellata and Ciliata from the Subantarctic are discussed. Differences in the antioxidizing enzymes observed between red-blooded and white-blooded fish are also reported. In particular, a significant lowering of the superoxide dismutase (SOD) and catalase content is noted in white-blooded fish. The distribution of these enzymes is examined in different organs; SOD features of catalytic metal are discussed; mercury and cadmium content analyses show a marked cadmium concentration in the fish. (Auth. mod.)

B-46129

Tota, B., **Morpho-functional aspects of the heart of antarctic haemoglobin-free teleosts** [Aspetti morfofunzionali del cuore di teleostei antartici privi di emoglobina], Atti del Primo Convegno di Biologia Antartica, Roma, CNR, 22-23 giugno, 1989 (Meeting on Biology in Antarctica, 1st, Rome, Italy, CNR, June 22-23, 1989. Proceedings). Edited by B. Battaglia, P.M. Bisol and V. Varotto, Padova, Edizioni Universitarie Patavine, 1990, p.299-318, In Italian with English summary. 25 refs.

The gross and microscopic anatomy of the heart ventricles in the haemoglobin-free icefish *Chaenocephalus aceratus* and *Chinodraco hamatus* is described. The ventricle is sac-like in shape, and has a relative mass which is around 3 times larger than that of related red-blooded antarctic fish. The myocardium is entirely trabecular, consisting of myocytes, granulated non-contractile cells and electron dense interstitial spaces. Ventricular myocytes in icefish *(C. aceratus)* contain only minute traces of myoglobin. Results suggest that the proliferation of mitochondria in the myocardium of icefish may serve to compensate for the absence of myoglobin under certain conditions by reducing the average diffusion path length for oxygen between the ventricular lumen and outer mitochondrial membrane. Blood supply to the ventricle in *C. aceratus* is derived both through the venous lacunary circuit and through vessels in the subepicardium. There are two size classes of vessels with mean diameters of 15 and 50 microns. The larger vessels are directly connected to the intertrabecular spaces. These morphological observations are related to the dynamics of the ventricles of *C. aceratus* and *C. hamatus* as a high flow/low pressure pump. (Auth. mod.)

B-46130

Maffia, M., **Enzymatic adaptation to low temperatures in antarctic teleosts** [Meccanismi dell'adattamento enzimatico alle basse temperature dei teleostei antartici], Atti del Primo Convegno di Biologia Antartica, Roma, CNR, 22-23 giugno, 1989 (Meeting on Biology in Antarctica, 1st, Rome, Italy, CNR, June 22-23, 1989. Proceedings). Edited by B. Battaglia, P.M. Bisol and V. Varotto, Padova, Edizioni Universitarie Patavine, 1990, p.319-326, In Italian with English summary. 4 refs.

Enzymatic activities and the phospholipid composition of the intestinal mucosa have been investigated both in the antarctic fish *Pagothenia bernacchii* and in the temperate fish *Anguilla anguilla.* It is found that each of these two species has a different phospholipid composition of the intestinal mucosa. In particular, phosphatidylethanolamine and sphingomyelin in the bernacchii were 39.9% and 3.5% of total phospholipids, while in the anguilla they were 24.7% and 11.8%, respectively. These findings indicate that the increase of enzymatic rates, the decrease of activation energies and the modification of membrane cellular lipid bilayer are important adaptation strategies of *Pagothenia bernacchii* to ensure an adequate metabolic rate and membrane fluidity in the subzero antarctic environment. (Auth. mod.)

B-46131

Focardi, S., Leonzio, C., Fossi, C., Bargagli, R., **Levels of chlorinated hydrocarbons and mixed function oxidase activity in antarctic organisms** [Studi sui livelli di alcuni xenobiotici e sulle attività del sistema "mixed function oxidase" (MFO) in organismi antartici], Atti del Primo Convegno di Biologia Antartica, Roma, CNR, 22-23 giugno, 1989 (Meeting on Biology in Antarctica, 1st, Rome, Italy, CNR, June 22-23, 1989. Proceedings). Edited by B. Battaglia, P.M. Bisol and V. Varotto, Padova, Edizioni Universitarie Patavine, 1990, p.327-334, In Italian with English summary. 12 refs.

A study is reported on 7 species of fish collected in Dec.-Jan, 1987-1989, in the Ross Sea: *Pagothenia bernacchii, Pagothenia hansoni, Trematomus centronotus, Trematomus newnesi, Chionodraco hamatus, Cygnodraco mawsoni,* and *Gymnodraco acuticeps.* Hexachlorobenzene (HCB), pp'DDE, pp'DDT and polychlorinated biphenyls (PCBs) were found in all 7 species. Concentrations in muscle were around 1-2 ng/g dry weight for pp'DDE and 0.5 ng/g d.w. for HCB and pp'DDT. The levels of HCB, pp'DDE, pp'DDT and PCBs in these antarctic organisms indicate that, so far, the activities at the Terra Nova Bay Station have not been felt by the ecosystem. Also reported are relative enzyme activities studied in 4 species, *Adamussium colbecki, Catharacta maccormicki, Pagothenia bernacchii* and *Chinodraco hamatus,* collected in the same area. Interspecifc differences were found for most of the enzymes tested. (Auth. mod.

B-46132

Viarengo, A., **Metal contents in tissues of *Adamussium colbecki* and role of metallothioneins in detoxification of heavy metals** [Valutazione del contenuto in metalli (K, Na, Mg, Ca, Mn, Fe, Cu, Cd, Zn) in differenti tessuti di *Adamussium colbecki:* possibile ruolo delle metallotioneine nei processi di omeostasi e detossificazione dei metalli pesanti (Cu, Cd, Zn)], Atti del Primo Convegno di Biologia Antartica, Roma, CNR, 22-23 giugno, 1989 (Meeting on Biology in Antarctica, 1st, Rome, Italy, CNR, June 22-23, 1989. Proceedings). Edited by B. Battaglia, P.M. Bisol and V. Varotto, Padova, Edizioni Universitarie Patavine, 1990, p.335-342, In Italian with English summary. 18 refs.

The concentration of heavy metals (Cu, Cd, Zn) and the metallothionein content in the tissues (gills and digestive gland) of the scallop *Adamussium colbecki,* are evaluated; the tissue levels of other essential cations (K, Na, Ca, Mg, etc.) are estimated. The results are compared to data obtained from mussels *(Mytilus galloprovincialis),* which indicate an accumulation of Fe in the digestive gland and the presence of high levels of Ca and Mg in the gills and digestive gland of *Adamussium.* In the gills of *Adamussium,* the concentrations of Cu, Zn and Cd are generally slightly lower than in *Mytilus.* Similar data were obtained for the digestive gland Cu and Zn content. In the digestive gland of *Adamussium,* a high Cd concentration is found. More than 40% of the total Cd in this tissue is bound to a protein showing general characteristics of metallothioneins. Also in the gills of *Adamussium,* and in the tissues of *Mytilus,* a significant amount (about 30%) of total Cu and Cd is bound to thioneins. These results demonstrate that in the cells of antarctic molluscs metallothionein represents a physiological mechanism in heavy metal cation homeostasis. (Auth. mod.)

B-46133

Cognetti Alfinito, G., ***Adamussium colbecki* and heavy metals in the Ross Sea** [Contributo alla conoscenza del bivalve antartico *Adamussium colbecki* (E.A. Smith) della baia di Ross: metalli pesanti], Atti del Primo Convegno di Biologia Antartica, Roma, CNR, 22-23 giugno, 1989 (Meeting on Biology in Antarctica, 1st, Rome, Italy, CNR, June 22-23, 1989. Proceedings). Edited by B. Battaglia, P.M. Bisol and V. Varotto, Padova, Edizioni Universitarie Patavine, 1990, p.343-363, In Italian with English summary. 15 refs.

The detection of Cu, Fe, Cr, Cd, Mn and Zn was carried out in the tissues of *Adamussium colbecki* collected in Terra Nova Bay in the summer of 1988-1989. Results compared with literature data on Pectinidae show that *A. colbecki* has the same organ distribution of heavy metals: the Cu, Fe, Cr and Cd are accumulated in the digestive gland, while Mn and Zn are found mainly in the kidney. Moreover, even though the concentrations of Cu, Fe and Cr are low in *A. colbecki,* the content of these metals in each organ as a percentage of the total body-burden of the soft parts is very similar to that of *Pecten jacobaeus* from the Adriatic Sea. Renal concentrations of Mn and Zn are found to be markedly lower in *A. colbecki* than in various species of Pectinidae.

B-46134

Harrison, P., Gargano, S., Maresca, B., **Regulation of the gene hsp70 in antarctic fish** [Analisi fisica e regolazione del gene hsp70 in pesci antartici], Atti del Primo Convegno di Biologia Antartica, Roma, CNR, 22-23 giugno, 1989 (Meeting on Biology in Antarctica, 1st, Rome, Italy, CNR, June 22-23, 1989. Proceedings). Edited by B. Battaglia, P.M. Bisol and V. Varotto, Padova, Edizioni Universitarie Patavine, 1990, p.365-376, In Italian with English summary. 10 refs.

The molecular organization and control of expression of hsp70 genes in southern ocean fish of the sub-order Notothenioidei is studied. These animals are of interest with respect to heat shock response, in that they experience low but extremely stable environmental temperatures. The aim is to determine the nucleotide sequence of hsp70 genes from notothenioids. If the gene is not expressed in some species one may see this reflected in modifications in the promotor region. To date, the presence of multiple copies of hsp70-like sequences was demonstrated in the genomes of both high and low latitude notothenioids by hybridization with radiolabelled *Drosophila hsp*70 gene probes. It was shown that in tissue isolated from specimens of *Notothenia rossii* maintained at 0 C, hsp70 genes are induced at temperatures of 5 C and above. These are the lowest temperatures at which the heat shock response has been reported in any eukaryote. The observations can be related to the predominantly low latitude distribution of this species and its consequent exposure to natural temperature fluctuations. (Auth. mod.)

B-46150

Capelli, R., Minganti, V., Fiorentino, F., De Pellegrini, R., **Mercury and selenium in *Adamussium colbecki* and *Pagothenia bernacchii* from the Ross Sea (Antarctica) collected during the Italian expedition in 1988-89,** Antarctica Project. Environmental impact: chemical methodologies, [Rome, Italian Research Council, 1991], p.357-369, Reprinted from Annali di chimica, 1991, Vol.81(7-8 and 9-10). 4 refs.

Concentrations of mercury (total and organic) and selenium in soft parts of *Adamussium colbecki,* collected in the Ross Sea during the Italian Antarctic Expedition 1988-89 are reported. Differences between median values (Hg-t=0.185 microgram/g dry weight with

31.7% of organic form, and Se=9.53 microgram/g DW) and those obtained in 1978-88 sampling (Hg-t=0.126 microgram/g DW with 16.8% of organic form, and Se=11.7 microgram/g DW) are evaluated. Concentrations of mercury (total and organic) and selenium in gonad and kidney of *Pagothenia bernacchii* are also given. Median values in gonad are: Hg-t=0.120 microgram/g DW with 47.8% of organic form and Se=4.98 microgram/g DW; in kidney: Hg-t=0.0990 microgram/g DW with 39.1% of organic form, and Se=7.62 microgram/g DW. Distribution of mercury and selenium among the different tissues and organs in *Pagothenia bernacchii* is considered. Differences between the two sampling years are also discussed. (Auth.)

B-46168

Buiarelli, F., Cartoni, G., Vicedomini, M., Zoccolillo, L., **Long lasting pesticides in antarctic surface fresh water,** Antarctica Project. Environmental impact: chemical methodologies, [Rome, Italian Research Council, 1991], p.589-593, Reprinted from Annali di chimica, 1991, Vol.81(7-8 and 9-10). 3 refs.

The procedure used for the analysis of antarctic samples of surface fresh water taken during the 1988-89 Italian expedition is reported. After solvent extraction, samples were examined to evaluate the presence of some chlorinated pesticides by GC with ECD and GC-MS. Many small peaks with retention times in the PCB and chlorinated pesticides range were observed in GC-ECD. None of the observed peaks among the chlorinated pesticides was identified by SIM-GC-MS. The detection limit of 8 chlorinated pesticides including lindane and p,p'DDT, obtained by SIM-GC-MS, is reported. (Auth.)

B-46178

Ekau, W., **Reproduction in high antarctic fishes (Notothenioidei),** *Meeresforschung,* Nov. 1991 33(2-3), p.159-167, Refs. p.166-167.

During two cruises of RV *Polarstern* in summer 1985 and in spring 1986, material was collected to investigate reproductive characteristics of notothenioid fish from the Weddell Sea. The study focussed on females of 15 species belonging to the families Artedidraconidae, Bathydraconidae, Channichthyidae and Nototheniidae. Spawning time was estimated from the maturity stages and gonadosomatic indices of 360 specimens. *Trematomus centronotus* and *Trematomus eulepidotus* spawn in summer, *Chionodraco myersi, Akarotaxis nudiceps, Cryodraco antarcticus, Trematomus lepidorhinus,* and *Trematomus loennbergii* spawn in autumn. *Aethotaxis mitopteryx, Trematomus nicolai,* and *Trematomus scotti* probably spawn in winter and *Chionodraco hamatus, Artedidraco shackletoni,* and *Cygnodraco mawsoni* in spring. Oocyte diameter and fecundity were determined for 112 specimens of 15 different species. Absolute fecundity was 170-13,000 oocytes of 204 mm diameter, when ripe, depending on family and species. (Auth.)

B-46184

Lizotte, M.P., Priscu, J.C., **Photosynthesis-irradiance relationships in phytoplankton from the physically stable water column of a perennially ice-covered lake (Lake Bonney, Antarctica),** *Journal of phycology,* Apr. 1992 28(2), p.179-185, Refs. p.184-185.

The photosynthesis-irradiance characteristics of phytoplankton were examined from four depths of Lake Bonney to determine their physiological condition relative to vertical gradients in irradiance and temperature. All populations studied showed evidence of extreme shade adaptation, including low Ik values and extremely low maximal photosynthetic rates, which were controlled by temperature as well as light variations with depth. Lake Bonney has an inverted temperature profile within the trophogenic zone that increased from 0 C at the ice-water interface to 6 C from 10 to 18 m. Deeper phytoplankton (10 m and 17 m) were found to have photosynthetic capacities and efficiencies 3-5 times higher than those at the ice-water interface. Lake Bonney phytoplankton (primarily cryptophytes and chlorophytes) had photosynthetic characteristics similar to diatoms from other physically stable environments (e.g. sea ice, benthos) and may be ecologically analogous to multiple deep chlorophyll maxima. (Auth. mod.)

B-46185

Davey, M.C., Clarke, K.J., **Fine structure of a terrestrial cyanobacterial mat from Antarctica,** *Journal of phycology,* Apr. 1992 28(2), p.199-202, 20 refs.

The fine structure of a cyanobacterial mat collected from the fellfield ecosystems of Signy I. was examined using some novel light and scanning electron microscope techniques. The mat was up to 5 mm thick and was distinctly layered. The surface of the mat consisted of nonliving material above a zone of *Phormidium autumnale* (Ag.) Gom. filaments. It is suggested that the surface layer protects the cyanobacterium from the effects of desiccation or high irradiance. Lower layers were less structured than the upper layer and included other taxa of cynobacteria and eukaryotic algae, although still dominated by *Phormidium.* The lowest layers consisted of dead organic material. The mat bound large amounts of inorganic material within and between the subsurface layers. (Auth.)

B-46225

Sakshaug, E., Slagstad, D., Holm-Hansen, O., **Factors controlling the development of phytoplankton blooms in the antarctic ocean—a mathematical model,** *Marine chemistry,* Nov. 1991 35(1-4), Symposium on Biochemistry and Circulation of Water Masses in the Southern Ocean, July 1990. Proceedings. Edited by P. Tréguer and B. Quéguiner, p.259-271, 32 refs.

A mathematical model describing the development of phytoplankton blooms as a function of the depth of the wind-mixed layer, spectral distribution of light, passage of atmospheric low-pressure systems, size of the initial phytoplankton stock and loss rates is presented. Model runs represent shade-adapted, large-celled, bloom-forming diatoms. Periodic deep mixing caused by strong winds may severely retard the development of blooms and frequently abort them before macronutrients are completely exhausted. Moderate depths of mixing (40-50 m) in combination with a moderately large total loss rate (about 0.013/h) can prevent blooms from developing during the brightest time of the year. Complete exhaustion of macronutrients in the upper waters is likely only if the wind-mixed layer is less than 20 m deep, i.e. in very sheltered waters, and also in the marginal ice zone when ice is melting. One cannot exclude the possibility of control of phytoplankton biomass by iron in ice-free, deep-sea parts of the antarctic ocean, but the implied enhancement of export production through addition of iron might be restricted because of limitation by light, i.e. vertical mixing. (Auth.)

B-46226

Jacques, G., **Is the concept of a new production—regenerated production valid for the southern ocean,** *Marine chemistry,* Nov. 1991 35(1-4), Symposium on Biochemistry and Circulation of Water Masses in the Southern Ocean, July 1990. Proceedings. Edited by P. Tréguer and B. Quéguiner, p.273-286, 45 refs.

The concepts developed for nutrient-limited areas are not readily applicable to the southern ocean, which is, paradoxically, an 'oligotrophic' but not nutrient-limited ecosystem. A synthesis of direct and indirect measurements clearly shows the uniqueness of the southern ocean. The presence of a pycnocline allows the calculation of new production by measurement of the depletion of nitrate that results from winter mixing or from permanent nutrient supply. The nitrate flux entering the euphotic layer cannot be used as an index of primary production. It is necessary to take into account the nutrient leaving the system by way of the water masses originating in the southern ocean: the Antarctic Bottom Water and Antarctic Intermediate Water. The classical relationship between *f* and total production is not appropriate. The oceanic zone concurrently exhibits a low production (less than 50 g C/sq m/year) and a high *f* ratio (at times more than 0.5). The fourth original aspect is the high regenerated production that occurs in a nitrate-rich environment with concentrations which frequently remain above 20 mM/cu m. Diatoms create the main organic flux, i.e. either during episodic events in the SIZ (more than 80% of the annual flux during a very short summer period), or regularly throughout the summer season in the 'oceanic' areas. (Auth. mod.)

B-46227
Owens, N.J.P., Priddle, J., Whitehouse, M.J., **Variations in phytoplanktonic nitrogen assimilation around South Georgia and in the Bransfield Strait (southern ocean),** *Marine chemistry,* Nov. 1991 35(1-4), Symposium on Biochemistry and Circulation of Water Masses in the Southern Ocean, July 1990. Proceedings. Edited by P. Tréguer and B. Quéguiner, p.287-304, 38 refs.

Nitrogen assimilation was measured in two austral summers in the Scotia Sea around the island of South Georgia as well as the Bransfield Strait. Nitrate and ammonium assimilation was measured using N-15 techniques, and the population was divided into two size classes, less than and greater than 20 microns. Water column integrated nitrogen assimilation rates varied between 2.43 and 26.50 mmol N/sq m/day, the distribution being highly heterogeneous. The highest assimilation rate was found at a station near South Georgia, where the chlorophyll standing stock was elevated. A high assimilation rate was observed at a station in the Bransfield Strait and was associated with a localized, shallow mixed-layer feature. The less than 20 microns size fraction contributed to a variable but frequently significant proportion of the total assimilation (14-78%). The *f* ratios were generally low, signifying a high dependence of the population on ammonium as a nitrogen source. Small phytoplankton exhibited a statistically significant greater preference for ammonium than did large species, and the total community *f* ratio was influenced strongly by the proportion of the less than 20 microns fraction and ammonium concentration. It is suggested that nutrients may play a more important role in the ecology of the phytoplankton in the southern ocean than is usually supposed. (Auth.)

B-46228
Lancelot, C., **Modelling carbon cycling through phytoplankton and microbes in the Scotia-Weddell Sea area during sea ice retreat,** *Marine chemistry,* Nov. 1991 35(1-4), Symposium on Biochemistry and Circulation of Water Masses in the Southern Ocean, July 1990. Proceedings. Edited by P. Tréguer and B. Quéguiner, p.305-324, 35 refs.

An ecological model to calculate phytoplankton development and microbial loop dynamics in the marginal ice zone of the antarctic ecosystem has been established on the basis of physical and biological measurements carried out in the marginal ice zone of the Scotia-Weddell Sea sector of the southern ocean during sea ice retreat 1988 (EPOS 1 and 2 expeditions). Application of this model at latitudes where sea ice retreat occurs and in adjacent open sea and permanently ice-covered areas demonstrated that the marginal ice zone is a region of enhanced primary and bacterioplankton production. Combining the results of the phyto- and bacterioplankton models allowed the quantitative estimate of the carbon fluxes through the lower level of the planktonic food web of the Weddell Sea marginal ice zone during the sea ice retreat period. The resulting carbon budget revealed the quantitative importance of microbial and micrograzing processes in the pathways of net primary production, 71% of this latter being assimilated in the microbial food web. However, total net microbial food web secondary production contributed 28% of 'marginal ice zone-produced' food resources available to krill and other zooplankton. (Auth.)

B-46229
Nöthig, E.M., **Regional relationships between biological and hydrographical properties in the Weddell Gyre in late austral winter 1989,** *Marine chemistry,* Nov. 1991 35(1-4), Symposium on Biochemistry and Circulation of Water Masses in the Southern Ocean, July 1990. Proceedings. Edited by P. Tréguer and B. Quéguiner, p.325-336, 39 refs.

The surface layer properties of the Weddell Gyre were measured during a cruise of the R/V *Polarstern* in Sep. and Oct. 1989 on a transect between the tip of the Antarctic Peninsula and Cape Norvegia. Sea ice cover, hydrography, and the distribution of inorganic nutrients and dissolved oxygen represented late winter conditions: a quasi-homogeneous Winter Water layer with near-freezing temperatures, high salinities and high levels of nitrate, and undersaturated with dissolved oxygen. The area investigated could be divided into three regions based on the physical, chemical and biological patterns: the western and eastern flanks and the gyre interior. In all areas, autotrophic biomass in sea ice was high in comparison with the underlying water column. Within the sea ice mainly diatoms and dinoflagellates were present, while the dominant autotrophic organisms in the water column were nanoflagellates. Ammonium values were relatively high in the Winter Water layer in the central region, indicating heterotrophic activity. Mesozooplankton was dominated by copepods, which can in turn be divided into two groups: overwintering, inactive *Calanus acutus* were found in the Warm Deep Water, whereas actively feeding *Calanus propinquus* were most abundant in the upper 120 m of the water column under the sea ice in the central region. These spatial differences may influence development of the respective summer pelagic communities. (Auth.)

B-46230
Alder, V.A., Boltovskoy, D., **Ecology and biogeography of tintinnid ciliates in the Atlantic sector of the southern ocean,** *Marine chemistry,* Nov. 1991 35(1-4), Symposium on Biochemistry and Circulation of Water Masses in the Southern Ocean, July 1990. Proceedings. Edited by P. Tréguer and B. Quéguiner, p.337-346, 24 refs.

Qualitative and quantitative analyses of the tintinnids retrieved in surface and vertical (down to 1150 m) samples in the Scotia, Weddell, Bransfield and Bellingshausen areas allow one to define three distinct zones: the Scotia Sea, Bransfield Strait and oceanic waters of the northern-central Weddell Sea, dominated by *Codonellopsis gaussi* and *Cymatocylis affinis/convallaria;* shelf and mostly ice-covered areas of the southernmost Weddell Sea and the Bellingshausen Sea, characterized by *Laackmanniella prolongata* and *Cymatocylis drygalskii;* and Bransfield-Weddell waters around the tip of the Antarctic Peninsula, where *Codonellopsis balechi* accounts for 80% of the tintinnids. These areas have different ice regimes, water-column depths, surface salinities, bulk planktonic settling volumes and microplanktonic concentrations. On the other hand, the composition of tintinnid assemblages is very similar on both sides of the Antarctic Peninsula. Causal interpretations for these heterogeneous distribution patterns and probable specific adaptations to the dissimilar environmental settings involved are analyzed. (Auth.)

B-46231
Svansson, A., **Simple primary production model for the NW Weddell Sea,** *Marine chemistry,* Nov. 1991 35(1-4), Symposium on Biochemistry and Circulation of Water Masses in the Southern Ocean, July 1990. Proceedings. Edited by P. Tréguer and B. Quéguiner, p.347-354, 11 refs.

Experience during the EPOS-2 cruise on board the R/V *Polarstern* in 1988-1989 has led to the construction of a model which may contribute to the understanding of the problem of limiting factors for the primary production in the antarctic ocean. As in mixed layer (ML) theories, it is anticipated in the present model that the physical factors of mixing and self-shading are limiting when the major nutrients are abundant. However, whereas ML models presuppose considerable mixing in the ML and very low mixing below the ML, it is assumed here that there is a moderate amount of mixing from the sea surface downwards. A diffusion model has thus been used. This approach has been chosen because well-mixed surface layers were not often found during EPOS-2; there was a continuous decrease in chlorophyll and a continuous increase in water density with depth. A relationship between chlorophyll content and irradiance attenuation is used as a self-shading function. A diffusion coefficient of 250,000 sq m/s (together with a loss factor of 0.18/day) fulfills reasonably well the steady-state limiting conditions for the average of an ensemble of the chlorophyll *a* data collected during EPOS-2. The model is also applied to conditions in which a nutrient, here phosphate, has a limiting influence. (Auth.)

B-46232

Rau, G.H., Sullivan, C.W., Gordon, L.I., ***delta* C-13 and *delta* N-15 variations in Weddell Sea particulate organic matter,** *Marine chemistry,* Nov. 1991 35(1-4), Symposium on Biochemistry and Circulation of Water Masses in the Southern Ocean, July 1990. Proceedings. Edited by P. Tréguer and B. Quéguiner, p.355-369, 33 refs.

The *delta*C-13 and *delta*N-15 of particulate organic matter (POM) sampled from the Weddell Sea in 1986 and 1988 ranged from -30.4 to -16.7 per mill and from -5.4 to +41.3 per mill, respectively. These large variations in POM *delta*C-13 and *delta*N-15 may reflect spatial/temporal changes in the concentrations and isotope abundances of CO2(aq.) and NH4 cation, respectively. Elevated isotope values were found exclusively in POM or closely associated with sea ice, which may be the source of the C-13 and N-15 enriched sediments observed in this region. (Auth.)

B-46233

Fontugne, M., Descolas-Gros, C., De Billy, G., **Dynamics of CO2 fixation in the southern ocean as indicated by carboxylase activities and organic carbon isotopic ratios,** *Marine chemistry,* Nov. 1991 35(1-4), Symposium on Biochemistry and Circulation of Water Masses in the Southern Ocean, July 1990. Proceedings. Edited by P. Tréguer and B. Quéguiner, p.371-380, 24 refs.

Recent studies have suggested that a direct relationship exists between the dissolved CO2 concentration and the carbon isotopic composition of phytoplankton in the surface ocean. Thus, measurement of the *delta*C-13 of planktonic organic matter in deep-sea cores can potentially yield a record of the past atmospheric CO2 variations. However, results are presented from the three cruises in the Indian and Atlantic sectors of the southern ocean (between 40 and 66S) in which biochemical and physiological factors associated with photosynthetic processes lead to carbon isotopic fractionation by phytoplankton which cannot be directly related to variations within the mineral carbon pool. Simultaneous measurements of the carboxylase activities and the C-13/C-12 ratio of particulate organic carbon show that there is a large variability in phytoplankton carbon metabolism, especially on a seasonal scale, in spite of a relative uniformity in the environmental conditions. Phytoplankton carbon metabolism is clearly a main factor governing variations in the stable isotopic composition of organic matter in the euphotic layer. Interrelationships between light, Rubisco activity and *delta*C-13 are clearly shown by the authors' data. Heterotrophic processes also may influence the carbon isotope mass balance, especially during the break-up of the ice pack. In addition to the influence of photosynthetic metabolism, the effect of the meridional temperature gradient is also verified by the data set. (Auth.)

B-46234

Kirst, G.O., **Dimethylsulfoniopropionate (DMSP) in ice algae and its possible biological role,** *Marine chemistry,* Nov. 1991 35(1-4), Symposium on Biochemistry and Circulation of Water Masses in the Southern Ocean, July 1990. Proceedings. Edited by P. Tréguer and B. Quéguiner, p.381-388, 27 refs.

During the EPOS 1 expedition (leg 1, 1988) into the Weddell Sea the dimethylsulfoniopropionate (DMSP) contents of various ice-algal assemblages and phytoplankton populations in the open water and in the ice edge zones were investigated. The chlorophyll *a* content in the ice samples was 25-70 times higher than that of the open water column, and about 100-390 more than in the under-ice water column. The DMSP content in ice-algae was about 20-56 times higher than in the open water, and 107-245 than in the under-ice water. There was no strict (linear) correlation between pigment content and DMSP concentration, although high chlorophyll values were always accompanied by high DMSP content. The variability of DMSP data can be explained by variation in species composition. Especially high concentrations were observed in samples where *Phaeocystis pouchetii* was present. In ice DMSP may have a twofold biological role: as an osmolyte and/or as a cryoprotectant (antifreeze). (Auth.)

B-46240

Quéguiner, B., Tréguer, P., Nelson, D.M., **Production of biogenic silica in the Weddell and Scotia Seas,** *Marine chemistry,* Nov. 1991 35(1-4), Symposium on Biochemistry and Circulation of Water Masses in the Southern Ocean, July 1990. Proceedings. Edited by P. Tréguer and B. Quéguiner, p.449-459, 21 refs.

During the EPOS leg 2 cruise the production rate of biogenic silica in the euphotic zone was measured by the Si-30 method at stations in the Scotia and Weddell Seas. The highest integrated production rates were observed in the Scotia Sea (range: 11.2-20.6 mmol Si/sq m/day), the marginal ice zone of the Weddell Sea exhibiting somewhat lower values (range: 6.0-20.0 mmol Si/sq m/day). The results demonstrate that as far as biogenic silica production is concerned, the marginal ice zone of the Weddell Sea is considerably less productive than that of the Ross Sea. They also indicate that the water of the Antarctic Circumpolar Current (ACC) could be more productive in late spring and early summer than at the beginning of spring. Possible reasons for the differences among the three subsystems (Ross Sea, Weddell Sea and ACC) are discussed. (Auth.)

B-46241

Nelson, D.M., Ahern, J.A., Herlihy, L.J., **Cycling of biogenic silica within the upper water column of the Ross Sea,** *Marine chemistry,* Nov. 1991 35(1-4), Symposium on Biochemistry and Circulation of Water Masses in the Southern Ocean, July 1990. Proceedings. Edited by P. Tréguer and B. Quéguiner, p.461-476, 35 refs.

Determination was made of the distributions of biogenic particulate silica and dissolved silicic acid in the upper 80 m over the continental shelf of the southern Ross Sea during two occupations of an east-west transect at 76.05S in mid-Jan. and early Feb. 1990. There was a persistent diatom bloom within a surface meltwater lens extending 100-150 km seaward from the edge of the receding pack ice, with biogenic silica concentrations frequently exceeding 20 micro mol/l in the upper 15 m. There were also other significant maxima in biogenic silica, with concentrations greater than 7 micro mol/l at distances of 250-500 km seaward of the ice edge. These maxima were apparently unrelated to meltwater effects. Si-30 tracer experiments to measure the production and dissolution rates of biogenic silica as a function of depth within the upper 50 m at three stations within the ice-edge diatom bloom indicate that the specific production rate ranged from 0.05 to 0.12/day. The mean resulting net rate of biogenic silica production within the bloom, 12 mmol/sq m/day, leads to an estimated net annual silica production rate of 1.0 mol/sq m in the upper 50 m of the southwestern Ross Sea. A revised silica budget for the western Ross Sea indicates that virtually all silica exported from the upper 50 m must reach the sea-floor unless advective transport from the east is significant. (Auth. mod.)

B-46242

Tréguer, P., Van Bennekom, A.J., **Annual production of biogenic silica in the antarctic ocean,** *Marine chemistry,* Nov. 1991 35(1-4), Symposium on Biochemistry and Circulation of Water Masses in the Southern Ocean, July 1990. Proceedings. Edited by P. Tréguer and B. Quéguiner, p.477-487, 33 refs.

The total annual production of biogenic silica (BSi) of the antarctic ocean is estimated at about 50 trillion mol Si. This flux is calculated using available direct measurements of integrated silicic acid uptake rates, indirect estimates from field distribution of orthosilicic acid in austral winter compared with that in austral summer and/or after conversion of C-14 primary production using appropriate Si/C mole ratios measured for the four antarctic subsystems: the Polar Front Zone, the Permanently Open Ocean Zone, the Seasonal Ice Zone, and the continental shelves and coastal zones. It is shown that most of the total production of BSi occurs in the surface layers of the Permanently Open Ocean Zone and in the Seasonal Ice Zone, the contribution of the coastal areas being less relevant. The results fit well with previously described distributions of the net accumulation rates of opal in antarctic abyssal and coastal sediments. The mean ratio of net opal accumulation at the sea-bed to the net production of BSi in the surface layer of the antarctic ocean is about 15%. (Auth.)

B-46251

Franzmann, P.D., Rohde, M., **Obligately anaerobic, coiled bacterium from Ace Lake, Antarctica,** *Journal of general microbiology,* Sep. 1991 137(9), p.2191-2196, 26 refs.

A coiled or 'C-shaped', Gram-negative, non-motile bacterium was isolated from the anaerobic waters of Ace Lake, which has a salinity similar to that of seawater. The strain was obligately anaerobic and lacked oxidase, catalase and respiratory lipoquinones. It fermented glucose and peptones, and formed H2, CO2, and butyric, acetic and formic acids as major end-products. Pyruvate was metabolized to H2, CO2, and acetic and formic acids. The organism had an optimum temperature for growth of 15-16 C, and no growth occurred at 22 C. In synthetic medium, the generation time at 1.7 C *(in situ* lake temperature) was 53 h. The optimum NaCl concentration for growth was 0.3 M, with poor growth at 0.1 M (5.8%, w/v). The mol%G+C of the DNA was 25.9% (Tm). The bacterium could not be accommodated within current bacterial species based on phenotypic criteria. Although coiled bacteria have been previously observed in antarctic anaerobic environments, they had not been cultivated, and their metabolic capability and possible ecological role were unknown. (Auth.)

B-46254

Lee, W.G., Wilson, J.B., Meurk, C.D., Kennedy, P.C., **Invasion of the subantarctic Auckland Islands, New Zealand, by the asterad tree *Olearia lyallii* and its interaction with a resident myrtaceous tree *Metrosideros umbellata*,** *Journal of biogeography,* Sep. 1991 18(5), p.493-508, 53 refs.

There are two principal forest-forming tree species on the Auckland Is.: *Metrosideros umbellata* (rata), which has occupied the islands for at least 9000 years, and *Olearia lyallii* (Olearia), which probably established early in the nineteenth century. The structure, composition, dynamics and establishment of these forests were studied in an attempt to predict the long-term effects of Olearia on these islands and to resolve the management dilemma. Results show that ecologically the two species are clearly segregated. Rata dominates and regenerates in sheltered places on dense peats with relatively high concentrations of magnesium and calcium. Olearia, in contrast, encroaches on coastal tall-tussock grassland, megaherbfield, shrubland and dwarf mixed-forest communities, growing on peat soils with high total soluble salts, Na, P and K concentrations derived from the marine aerosol and perhaps ions accumulated through heavy use by seals. It is suggested that the presence of *O. lyallii* on the Auckland Is. is neither ecologically nor biogeographically anomalous, and that the species should not be eliminated. However, it may be desirable to maintain several small islands in Port Ross free of Olearia to preserve local examples of maritime tussock grassland and megaherbfields that will otherwise be restricted to a narrower band than they currently occupy. (Auth. mod.)

B-46257

Karentz, D., Dunlap, W.C., **Ultraviolet-absorbing compounds in antarctic organisms,** *Antarctic journal of the United States,* 1990 25(5), p.173-174, 6 refs.

Results from a survey of antarctic organisms for the presence of natural ultraviolet sunscreens are discussed. Mycosporine-like amino acid compounds (MAAs) absorb light from the ultraviolet portion of the solar spectrum. During spring 1988, 57 species (1 fish, 48 invertebrates and 8 algae) were collected from marine habitats in the vicinity of Palmer Station and analyzed by high performance liquid chromatography for the presence of MAAs. Eighty-six percent of the organisms studied contained at least one MAA. Eight MAAs in total were identified from these antarctic species. One MAA, which has not been reported from organisms studied at other latitudes, was found in 60% of the antarctic invertebrates analyzed.

B-46258

Mitchell, D.L., Karentz, D., **Molecular and biological responses of antarctic phytoplankton to ultraviolet radiation,** *Antarctic journal of the United States,* 1990 25(5), p.174-175, 1 ref.

Biological effects of increased ultraviolet-B (UV-B) radiation are discussed. Studies on the induction and repair of UV-B damage in various phytoplankton species collected at Palmer Station are described. The preliminary results indicate a great diversity in the photobiology of individual phytoplankton species. Consistent with the diverse molecular response to ultraviolet light, the ability of phytoplankton to survive the effects of UV-B light was found to be extremely variable. The UV-B doses required to kill, on average, one cell under the different light regimes are shown in a table. It is found that, within the cross-section of the marine community studied, relatively sensitive (e.g., *Thalassiosira* spp.) and resistant (e.g., *Coscinodiscus* spp.) phytoplankton species co-exist.

B-46259

Holm-Hansen, O., **Effects of ultraviolet-B and ultraviolet-A on photosynthetic rates of antarctic phytoplankton,** *Antarctic journal of the United States,* 1990 25(5), p.176-177, 3 refs.

Based on previous *in situ* studies, experiments conducted in 1989, designed to get better spectral resolution of the inhibition of photosynthetic rates by solar ultraviolet radiation, are discussed. Tabulated results show that ultraviolet-B radiation (280-320 nm) was responsible for approximately 50% of the total ultraviolet radiation photoinhibition. Ultraviolet-A radiation was responsible for the other 50% of the photoinhibition, but it was the shorter ultraviolet -A wavelengths (320-340 nm) that accounted for most of this inhibition of photosynthesis. Problems related to incubator experiments, such as those conducted in this study, are described.

B-46260
Dunton, K.H., Martin, L.R., Day, R.H., **Effects of diesel fuel arctic on photosynthesis and pigment levels in antarctic marine algae following the *Bahia Paraiso* fuel spill,** *Antarctic journal of the United States,* 1990 25(5), p.177-179, 9 refs.

Two months following the fuel spill from the grounding of *Bahia Paraiso* near Anvers I. in Jan. 1989, an attempt was made to quantify the physiological effect of the oil on intertidal and shallow subtidal macroalgal species. Photosynthetic production and pigment content were examined under concentrations of diesel fuel arctic (DFA) to which the plants were exposed. The results of photosynthetic measurements, shown in a figure for *Palmaria decipiens* and *Porphyra endiviifolia,* indicate no significant reduction up to concentrations of 20% DFA. *Desmarestia menziesii* demonstrated no significant reduction in photosynthesis at 10% DFA. The results of pigment analyses show no significant differences ($P>0.05$) in chlorophyll *a,* in a 10% DFA concentration, among all three species. However, at 20% DFA, chlorophyll *a* concentrations in *P. decipiens* were significantly lower. Phycobiliprotein content also dropped significantly in plants exposed to 10 and 20% DFA concentrations.

B-46262
Ferreyra, G.A., Alder, V.A., **Evolution of oxygen in microalgal intertidal communities near Palmer Station,** *Antarctic journal of the United States,* 1990 25(5), p.183-184, 4 refs.

The evolution of oxygen in a microalgal upper intertidal assemblage, dominated by the Chlorophyta *Urospora penicilliformis,* was studied under experimental laboratory conditions, focusing on the comparison of the area affected by the *Bahia Paraiso* oil spill with nearby sites around Palmer Station. Maximum rates of oxygen production were found in Hermit and Limitrophe Islands; minimum values were recorded in Laggard I. Comparison of the results from the other sampling sites with the area of the *Bahia Paraiso* grounding yielded no differences, either in the behavior of dissolved oxygen or in the species composition.

B-46263
Alder, V.A., **Tintinnid cytoplasmic volume and biomass,** *Antarctic journal of the United States,* 1990 25(5), p.184-185, 8 refs.

Observations, measurements and photographs were made of live specimens of 7 tintinnid species collected in the vicinity of Palmer Station and cultured experimentally under different laboratory conditions of feeding, temperature and illumination. Light proved to be of great importance for the survival of the ciliates: highest light intensities were unfit for tintinnid growth, while the lowest intensities and total darkness yielded high survival rates.

B-46264
Arrigo, K., Dieckmann, G., Gosselin, M., Sullivan, C.W., **Studies on the nutrient status in sea ice and underlying platelet layer of McMurdo Sound,** *Antarctic journal of the United States,* 1990 25(5), p.185-188, 10 refs.

To better understand the development and growth of the sea-ice microbial community, the nutrient environment of the platelet ice and the upper water column were studied in McMurdo Sound between Sep. 26 and Dec. 3, 1989. A new sampling device, ADONIS—inserted into a hole drilled into the ice—and its operating method are described. It is pointed out that the method provides valuable qualitative information on microalgal distributions within the platelet layer. Judging from spectral irradiance and from chlorophyll and inorganic nutrient profiles, it was determined that the distributions of algae in the platelet ice appear to be controlled by light, not by nutrient availability. It was noted that in the upper platelet ice, nitrate is depleted in the presence of high ammonium concentrations.

B-46265
Robinson, D.H., Sullivan, C.W., **Temperature dependence of the photosynthetic parameter alpha in antarctic sea-ice microalgae,** *Antarctic journal of the United States,* 1990 25(5), p.188-191, 7 refs.

To characterize the temperature dependence of alpha (linear portion of the photosynthesis-irradiance curve) and, through a systematic approach, to identify the temperature sensitive steps responsible for the observed effect, fresh samples of sea-ice microalgae, collected from beneath approximately 2 m of congelation ice at McMurdo Sound during the 1988-1990 field seasons, were analyzed. The temperature sensitivity of alpha appears to be at a site affecting the measured values of quantum yield. It is suggested that the temperature sensitivity of alpha may be only an apparent change, caused by overlaying carbon fixation from the light-independent beta-carboxylation pathway onto the light-dependent reductive pentose phosphate pathway.

B-46266
Gustafson, D.E., Jr., Anderson, M.R., Rivkin, R.B., **Bacterioplankton abundance and productivity at the ice-edge zone of McMurdo Sound, Antarctica,** *Antarctic journal of the United States,* 1990 25(5), p.191-193, 15 refs.

The distribution of bacterioplankton and phytoplankton at the ice edge during the late spring and early summer, prior to the delivery of *Phaeocystis* sp. into McMurdo Sound, is discussed. Vertical profiles of planktonic biomass, collected during late Oct. and late Nov. 1989 at 4 stations along an east-west transect at the ice edge, are presented in figures. At all stations, the distribution of bacteria was vertically uniform within the upper 100 m. Bacterial abundance and productivity increased over the season. On an areal basis, phytoplankton biomass was 5 to 15 times greater than bacterial biomass.

B-46267
Anderson, M.R., Rivkin, R.B., Gustafson, D.E., Jr., **Fate of bacterial production in McMurdo Sound in the austral spring,** *Antarctic journal of the United States,* 1990 25(5), p.193-194, 11 refs.

As part of a project examining the nutrition of planktotrophic echinoderm larvae, the abundance and production of potential prey for the larvae were measured in McMurdo Sound. Because bacteria may provide an important source of food, their division rates during the spring, and the potential loss to bacterivores, were calculated at a site 8 km north of Hut Point. Results show that bacterioplankton were relatively constant throughout the study period. Bacterial abundances showed no seasonal trend, although the bacteria were actively growing throughout the spring. Division rates ranged from 0.1 to 1.1 doublings per day; the average division rate was 0.6 doublings per day. It is concluded that grazing by bacterivores must be responsible for maintaining bacterial abundances relatively constant.

B-46268
Rivkin, R.B., Anderson, M.R., Gustafson, D.E., Jr., **Seasonal pattern of bacteria and net nano- and pico-phytoplankton in McMurdo Sound, Antarctica, during the austral spring,** *Antarctic journal of the United States,* 1990 25(5), p.195-196, 12 refs.

As part of a multidisciplinary study of nutrition of planktotrophic echinoderm larvae in McMurdo Sound, the distribution and abundance of bacteria and several size classes of phytoplankton are reported in this article. It is found that the abundance of potential prey for planktotrophic echinoderm larvae in McMurdo Sound during the study period was low, and that approximately 60% of the chlorophyll *a* was less than 10 microns. Seasonal patterns of bacteria and chlorophyll *a* and phaeopigments in the plankton during the period from Sep. to Dec. 1989 are shown in figures.

B-46269

Stoecker, D.K., Buck, K.R., Putt, M., **Flagellate- and ciliate-dominated microbial community in the land-fast ice,** *Antarctic journal of the United States,* 1990 25(5), p.197-199, 7 refs.

A unique flagellate and ciliate-dominated sea-ice microbial community, in the brine channels and pockets of the upper congelation ice during the late spring and early summer in eastern McMurdo Sound, is described. The community characteristics are presented in a table; scanning electron micrographs of critically point-dried organisms are shown. It is believed that the upper ice brine community in the land-fast ice at McMurdo will be an excellent model system in which to investigate the adaptations of sea ice microorganisms to transitions between planktonic and ice-bound existence.

B-46270

Putt, M., Börsheim, K.Y., Miceli, G., Stoecker, D.K., **Seasonal changes in cell size and abundance of bacterioplankton during the *Phaeocystis* sp. bloom in McMurdo Sound,** *Antarctic journal of the United States,* 1990 25(5), p.199-201, 8 refs.

B-46271

Amsler, C.D., **Quantitative analysis of the vertical distribution of overstory macroalgae near Anvers Island, Antarctica,** *Antarctic journal of the United States,* 1990 25(5), p.201-202, 7 refs.

Five study sites were located near Anvers I. in Mar.-Apr. 1989, where collections of macroalgae were carried out for species identification. Five macroalgal species or groups were observed in the overstory video quadrants: *Desmarestia antarctica; D, menziesii* and *D. anceps; Himantothallus grandifolius;* Red blades, primarily *Palmaria (Leptosarca) decipiens, Iridaea cordata, Curdia racowitzae, Myriogramme mangini, Gigartina skottsbergii, Porphyra plocamiestra,* and *Sarcodia (Kallymenia) antarctica;* and *Plocamium cartilagineum.* A sixth category consisting of crustose algae and bare rock was also recorded. The overall patterns were quite similar at all 5 sites, including the 3 sites where the surface of the ocean was covered by an oil slick resulting from the grounding of the *Bahia Paraiso.* There were no observable differences between these two groups of sites with respect to the percentage cover of either macroalgal overstory or crustose coralline algae.

B-46272

Stockton, W., **Intertidal zone at Palmer Station, Anvers Island, Antarctic Peninsula, in the wake of the *Bahia Paraiso* spill,** *Antarctic journal of the United States,* 1990 25(5), p.203, 7 refs.

Following the *Bahia Paraiso* oil spill in the vicinity of Palmer Station, an oil spill survey team observed that the principal intertidal alga, *Urospora* sp., grew abundantly in most offshore facing areas, though it had been reported to have turned brown soon after the spill occurred. Limpets were also found in many areas that had been exposed to oil, though it was estimated that half of the limpets had died during the month after the spill. The cryptic fauna found among a stable boulder field on Bonaparte Point, adjacent to the station, appeared to have been completely destroyed. It is pointed out that the lack of a strong base of quantitative information on the distribution and abundance of intertidal plants and animals prior to the oil spill makes the measurement of any long-term effects difficult.

B-46273

McClintock, J.B., Heine, J., Slattery, M., Weston, J., **Chemical bioactivity in common shallow-water antarctic marine invertebrates,** *Antarctic journal of the United States,* 1990 25(5), p.204-206, 17 refs.

A program examining chemical activity in benthic sponges, allowing an evaluation of the latitudinal hypothesis for chemical defense in marine invertebrates, is discussed. During the summer of 1989-1990, tissue samples of 18 species of sponges collected from depths of 20-40 m at a variety of locations in McMurdo Sound were examined, with the following results: 11 of the species had chemical activity; in most cases, extracts of such sponges had widespread effects on bioassay organisms, causing mortality in sea urchin gametes and a reduction in the capacity of sea stars to right themselves. Sea stars which do not feed on sponges or are feeding generalists showed sensory tube-foot retraction to aqueous sponge extracts from chemically active species. Additional benthic antarctic marine invertebrates which were found to be noxious or toxic are discussed.

B-46274

Manahan, D.T., Shilling, F.M., Welborn, J.R., Colwell, S.J., **Dissolved organic material in seawater as a source of nutrition for invertebrate larvae from McMurdo Sound, Antarctica,** *Antarctic journal of the United States,* 1990 25(5), p.206-208.

As part of a study to determine the differences in energy requirements and feeding strategies of echinoderm larvae in two contrasting environments, antarctic and temperate, the following was measured: concentrations of dissolved amino acids and sugars in sea water samples from McMurdo Sound; the rates of transport of specific organic substrates into larvae; and the metabolic rates of larvae as a basis for comparison of the contribution that the transport of dissolved organic matter could provide to larval energetics. Results of calculations reveal that dissolved organic matter could supply a significant input to the energy needs of embryos and larvae. Also observed was a net increase in dry organic mass during early development, leading to the conclusion that growth occurred for those stages lacking a digestive system through the use of dissolved organic matter.

B-46276

Bosch, I., Pearse, J.S., Basch, L.V., **Particulate food and growth of planktotrophic sea star larvae in McMurdo Sound, Antarctica,** *Antarctic journal of the United States,* 1990 25(5), p.210-212, 7 refs.

The relative importance of phytoplankton and bacteria as larval food was evaluated as part of a more general study of feeding and energy requirements of polar and temperate echinoderm larvae. Efforts during the 1989 field season in McMurdo Sound were focused on laboratory and field growth experiments of 40- to 90-day-old bipinnaria larvae of *Odontaster validus.* Results show that *O. validus* larvae grow on bacterized phytoplankton or on bacteria alone, but not when in particle-free water, and that they ingest natural phytoplankton and other large particles in the field, depending on their availability.

B-46277

Larson, R.J., Harbison, G.R., **Lipids in polar ctenophores and medusae: visual observations of location and origin,** *Antarctic journal of the United States,* 1990 25(5), p.212-213, 6 refs.

The presence of accumulated lipids was determined in medusae and ctenophores, collected in McMurdo Sound in Nov. and Dec. 1988, by visual examination of living specimens with a dissecting microscope. Lipids were seen in many of the more than 200 gelatinous zooplankton specimens collected, consisting of various size droplets and larger masses within the lumen of the gastrovascular system. In ctenophores, lipids were seen in the meridional canals below the comb rows. In medusae, they occurred either in the stomach, ring, and/or radial canals.

B-46278

Janssen, J., Coombs, S., Montgomery, J., Sideleva, V., **Comparisons in the use of the lateral line for detecting prey by notothenioids and sculpins,** *Antarctic journal of the United States,* 1990 25(5), p.214-215, 10 refs.

Studies show that nototheniids are able to locate prey via the lateral line and so are equipped to feed in the winter darkness or beneath the ice. Because sculpins respond to prey along the trunk as well as along the head, and suppress respiration when stimulated, it is suggested that the sculpins are more specialized for detecting prey via the lateral line than are the nototheniids.

B-46279

Kellermann, A.K., Radtke, R.L., Ruzicka, J.J., **Ageing studies on the early life stages of antarctic fishes,** *Antarctic journal of the United States,* 1990 25(5), p.215-217, 17 refs.

During the winter cruise of R/V *Polar Duke* in 1989, ichthyoplankton was caught in small plankton nets. The presence of young larvae indicated that hatching of *Electrona antarctica* continues through the period from June through Aug.; early stages of *E. antarctica* will be used to compare hatching periods and summer growth rates, decoded from otolith microstructure, with data obtained in winter. Eggs of the fish *Notothenia neglecta* collected on the same cruise were reared in plastic tanks; after hatching, larvae were removed for continued rearing under different temperature, light and feeding regimes. Microincrement patterns of sagittae of these reared larvae will be compared with those obtained from larvae hatched from field-caught eggs, to provide information on the effect of different feeding conditions on growth increment formation.

B-46280

Detrich, H.W., III, **Molecular interactions that stabilize antarctic fish microtubules at low temperatures,** *Antarctic journal of the United States,* 1990 25(5), p.218-219, 7 refs.

Studies of the polymerization energetics of pure antarctic fish tubulins at near-physiological and supraphysiological temperatures, completed during the past year, are discussed. Data from experiments conducted in *Notothenia coriiceps neglecta* indicate that much of the cold stability of antarctic fish microtubules results from alterations to their tubulins. Field studies conducted at Palmer Station from mid Mar. to mid May 1990 included the comparison of the domain structures of native brain tubulins from antarctic fishes and from a cow; these results are still being analyzed.

B-46281

Kooyman, G.L., Eckert, S.E., Kooyman, C.A., Horning, M., **Natural history of emperor penguins at Cape Washington,** *Antarctic journal of the United States,* 1990 25(5), p.219-220, 2 refs.

To continue a study on emperor penguins begun in 1986, a remote camp was established at Cape Washington on Oct. 27, 1990. Summarized results include the following: compared to 1986, there were about the same number of groups, but the total chick count was larger by about 2,000 birds; there were fewer dead chicks; about the same amount of leopard seal predation seemed to be occurring; foraging cycle durations ranged from 3-14 days during Nov.; about 12,000 dives were recorded from 11 birds.

B-46282

Trivelpiece, W.Z., **Demography and foraging behavior of Pygoscelis penguins,** *Antarctic journal of the United States,* 1990 25(5), p.220, 1 ref.

Some preliminary results are discussed of a study on penguins conducted in Admiralty Bay from Oct. 6, 1989 to Feb. 23, 1990. The field season encompassed two research projects: a continued investigation of the population demography of Adélie, gentoo, and chinstrap penguins, and a new study of the comparative foraging behaviors and diving depths of these species.

B-46290

Buma, A.G.J., De Baar, H.J.W., Nolting, R.F., Van Bennekom, A.J., **Metal enrichment experiments in the Weddell-Scotia Seas: effects of iron and manganese on various plankton communities,** *Limnology and oceanography,* Dec. 1991 36(8), p.1865-1878, 70 refs.

During the European *Polarstern* Study (EPOS 1988/1989) in the Weddell and Scotia Seas, five series of metal enrichment experiments were carried out with natural plankton communities, under ultraclean conditions. Despite a clear stimulation of growth by the addition of Fe, control bottles (no additions) also showed rapid buildup of Chl *a* and complete utilization of a major nutrient within 2 weeks, indicating nonlimiting ambient Fe levels. Effects of Mn additions were less pronounced or absent, whereas extra additions of Zn and Cu in one experiment showed little or no effect. The species composition of the plankton community, monitored by HPLC pigment analysis and microscopic observations, changed in favor of diatoms when Fe was added. The addition of Fe also caused an increase in microzooplankton densities and concentrations of pigment breakdown products. However, metal-mediated shifts in the plankton community were minor compared to major changes resulting from incubation. Changes were most pronounced in experiments where microzooplankton was strongly developed, presumably as a result of excluding mesozooplankton from the bottles. Fe had an impact on plankton growth and species composition, but other factors seem to be responsible for keeping phytoplankton productivity far from its potential in these antarctic waters. (Auth.)

B-46291

Helbling, E.W., Villafañe, V., Holm-Hansen, O., **Effect of iron on productivity and size distribution of antarctic phytoplankton,** *Limnology and oceanography,* Dec. 1991 36(8), p.1879-1885, 59 refs.

In shipboard experiments, addition of Fe to samples from antarctic shelf waters or from deep waters close to the shelf break did not have any detectable effect on phytoplankton populations. Fe addition to pelagic waters, however, increased Chl *a* concentrations by a factor of 4-7 times during 1-2 weeks of incubation, and also resulted in a shift from a nanoplankton-dominated population to one dominated by microplankton. If these shipboard experimental results are extrapolated to *in situ* results following enrichment of antarctic pelagic waters with Fe, there may be some mitigation of the greenhouse effect caused by elevated CO2 concentrations in the atmosphere. Not only would the rate of primary production increase, but also the percentage of primary production that is exported to deep water might be increased because of Fe favoring the growth of microplankton. (Auth.)

B-46292

Banse, K., **Rates of phytoplankton cell division in the field and in iron enrichment experiments,** *Limnology and oceanography,* Dec. 1991 36(8), p.1886-1898, 59 refs.

Increases in chlorophyll with time for contained coastal plankton, expressed as daily division rates, are on average about as high as rates for nutrient-replete cultures at similar temperatures, when daylength is considered. In offshore areas with persistent high nutrients but low chlorophyll, division rates from increased chlorophyll and cumulative NO3 uptake in the controls of Fe enrichments are on average also high and do not suggest marked Fe deficiency. The normally observed phytoplankton growth in the controls is interpreted as due to release from grazing. Addition of Fe in the treatments leads to blooms and exhaustion of NO3. Differences between controls and treatments in rates of chlorophyll increase and NO3 removal, however, as well as shifts in species composition toward rare species in the treatments, also indicate direct effects of Fe on phytoplankton. To clarify the issues, especially in respect to medium- and large-celled phytoplankton, the author recommends measurements of species-specific division rates. (Auth.)

B-46293

Berger, W.H., Wefer, G., **Productivity of the glacial ocean: discussion of the iron hypothesis,** *Limnology and oceanography,* Dec. 1991 36(8), p.1899-1918, Refs. p.1914-1918.

An increase in the productivity of the glacial- age southern ocean has been postulated to explain the decrease in *p*CO2 of the atmosphere observed in ice cores. A plausible mechanism has been proposed elsewhere that productivity is limited by the availability of Fe in this region and that the greater supply of eolian dust during glacial time removed this limit. Recently published evidence from cores from the southern ocean suggests that in fact there was no change in productivity in the assumed manner. Glacial-age productivity was indeed greatly increased in the equatorial Pacific and in the eastern boundary upwelling systems. The cause, presumably, was the mechanical action of glacial-age winds rather than a greater supply of Fe. However, a role of increased supply of micronutrients from the continents in the increase of equatorial productivity during glacial time cannot be excluded. Such enhancement from increased supply of dust would have the interesting corollary of more efficient export transfer to depth, possibly contributing to nutrient depletion in glacial-age, deep intermediate waters. There is some indication as well of a general decrease in nutrient content in the tropical thermocline in the western Pacific during the last several million years, a depletion that may have been fostered by an increasing supply of dust from emerging Asian highlands. Alternative explanations are available. The case for Fe as a major modifier of productivity and biogenic sedimentation on geological time scales cannot be made in the absence of criteria diagnostic for Fe supply as opposed to stirring and upwelling. (Auth.)

B-46295

Sarmiento, J.L., Orr, J.C., **Three-dimensional simulations of the impact of southern ocean nutrient depletion on atmospheric CO2 and ocean chemistry,** *Limnology and oceanography,* Dec. 1991 36(8), p.1928-1950, 57 refs.

The response of the ocean and atmosphere to a scenario of extreme depletion of southern ocean surface nutrients by an increase in the organic matter flux to the deep ocean is examined, with a three-dimensional model of ocean circulation coupled to a one-box model of the atmosphere. After 100 yr, the increase in organic matter flux is 6-30 Gt C/yr, about twice the global new production determined by the same model for the present ocean. The removal of nutrients from surface waters of the southern ocean reduces the nutrient content of the near-surface and intermediate depth waters of the entire ocean, resulting in a 0.5-1.9 Gt C/yr reduction of low-latitude new production. The deep circumpolar waters, enriched in nutrients by regeneration of organic matter, spread into the deep and bottom waters of the remainder of the ocean, giving an overall downward shift of nutrients from surface and intermediate to circumpolar and deep waters. The oceanic total C distribution is also shifted downward, resulting in uptake of atmospheric CO2 of 46-85 ppm (98-181 Gt C) in the first 100 yr. The oxygen content shifts upward in the water column, approximately mirroring the downward shift of nutrients. Some of the oxygen shifted to the upper ocean escapes to the atmosphere. As a consequence, the global average oceanic content of oxygen, presently 168 micro mol/kg, is reduced by 6-20 micro mol/kg, with anoxia developing in the southwestern Indian Ocean. (Auth.)

B-46296

Coleman, C.O., **Redescription of *Anchiphimedia dorsalis* (Crustacea, Amphipoda, Iphimediidae) from the Antarctic, and functional morphology of mouthparts,** *Zoologica scripta,* 1991 20(4), p.367-374, 17 refs.

For the first time a full description of *Anchiphimedia dorsalis* K.H. Barnard, 1930 is given. The functional morphology of the mouthparts and the anatomy of the digestive canal exhibit several unique features. Maxilla 1 has a short palp; the distal endite bears 45-60 setae, which might be used for scraping particles together. The laterodistal margins of the distal maxillipedal endites are curved anteriorly and could be used for brushing particles towards the other mouthparts. The midgut-gland has four caeca; the ventral caeca are very short. The gut of the examined specimens contained only fine detritus and sand grains. (Auth.)

B-46297

Lund, E.D., Sidell, B.D., **Neutral lipid compositions of antarctic fish tissues may reflect use of fatty acyl substrates by catabolic systems,** *Marine biology,* Mar. 1992 112(3), p.377-382, 20 refs.

Antarctic fishes contain large quantities of lipid in adipose tissue, blood and oxidative muscle. In this study, the fatty acyl compositions of free fatty acids (FFA) and triacylglycerol (TAG) in serum, adipose tissue and oxidative muscle were determined in two species of antarctic fishes, *Trematomus newnesi* Boulenger, 1902, and *Notothenia gibberifrons* Lönnberg, 1905, collected off the Antarctic Peninsula in Feb. and Mar. 1987. Total lipid contents of serum and oxidative muscle in each species were also measured. *T. newnesi,* a mesopelagic species, has significantly more lipid in the serum than *N. gibberifrons,* a demersal species. The oxidative muscle of *T. newnesi* also contains more lipid than does that of *N. gibberifrons.* Fatty acids comprising greater than 5% of one or more of the lipid pools assayed in both species include 14:0, 16:0, 16:1, 16:2, 18:0, 18:1, 20:5 and 22:6. The percentages of 16:1 were lower in oxidative muscle FFA than in all other assayed lipid pools in both species, suggesting a catabolic preference for some monocenes in oxidative muscle of these fishes. The percentage of 14:0 was two- to three-fold higher in adipose tissue TAG than in all other lipid pools in both species. Proteins involved in the mobilization, transport or catabolism of fatty acids exhibit differential recognition of fatty acids in *T. newnesi* and *N. gibberifrons.* (Auth. mod.)

B-46299

Adams, N.J., **Embryonic metabolism, energy budgets and cost of production of king *Aptenodytes patagonicus* and gentoo *Pygoscelis papua* penguin eggs,** *Comparative biochemistry and physiology,* Mar. 1992 101A(3), p.497-503, 38 refs.

Embryonic oxygen consumption *(M*O2) of King *Aptenodytes patagonicus* and Gentoo *Pygoscelis papua* penguins was similar to that of precocial or semi-precocial hatchlings, although behavioral traits suggest altricial hatchlings. In spite of the relatively longer incubation period and contrary to expectations, relative yolk contents of fresh King and Gentoo penguin eggs were similar, although energy density of King penguin eggs was slightly higher. However, hatchling mass of King penguins was considerably smaller as a percentage of initial egg mass than that of Gentoo penguins and most other bird species. The generally low energetic efficiency of embryonic growth of King penguins compared to Gentoo penguins can be ascribed to their relatively long incubation period. Based on estimates of yolk composition and length of yolk formation, daily cost of egg production of King penguins was estimated at 9.0% of basal metabolic rate (BMR) and 5.4% of BMR for the two-egg clutch of Gentoo penguins. The relatively high cost for King penguins largely reflects the short formation time of their eggs. (Auth.)

B-46300

Rodhouse, P.G., **Population structure of *Martialia hyadesi* (Cephalopoda: Ommastrephidae) at the Antarctic Polar Front and the Patagonian Shelf, South Atlantic,** *Bulletin of marine science,* Sep. 1991 49(1-2), Gilbert L. Voss International Symposium, Woods Hole, MA, June 1990, P.404-418, 23 refs.

Samples of the ommastrephid squid *Martialia hyadesi* were collected during fishing operations at the Antarctic Polar Frontal zone (APFZ) near South Georgia in Feb. 1989 and on the Patagonian Shelf in Mar. 1986. Specimens caught during daylight at the APFZ were smaller than those caught during darkness. Specimens caught at the APFZ during darkness were generally smaller and less sexually mature than those from the Patagonian Shelf. Principal components analysis of character indices revealed no discernible separation between the sexes or between specimens from the two areas. Comparison of means of individual character indices for specimens from the two areas revealed differences between some areas for some characters, but in several cases the possibility that these differences were size-related could not be discounted. Statoliths from samples taken from the modal mantle length at the APFZ were sectioned to reveal growth rings; the age of these specimens is estimated to be 9-12 months. It is proposed that the life cycle of *M. hyadesi* is associated with the West Wind Drift in the vicinity of the APFZ, that the spawning grounds lie to the west of the Scotia Sea, and that the occurrence of the species on the Patagonian Shelf in 1986 was related to cold water conditions in the area. (Auth. mod.)

B-46302

Meguro, H., Fukushima, H., Matsuda, T., **Distribution of the two types of ice diatom communities in the Antarctic,** *Journal of marine systems,* Mar. 1992 3(1-2), p.163-168, 26 refs.

Geographical distributions for two types of ice algal assemblages, "surface type" and "bottom type" are described for the antarctic sector (35-45E) around Lützow-Holm Bay. The surface type was found in a wide belt in the outer pack ice while the bottom type was found in the narrow band of fast ice near the ice shelf or in the bay. The surface type was characterized by a thick snow cover on thin sea ice, and the bottom type typically had thin snow cover on thick ice. The circumpolar continuity of meteorological conditions around the continent, and similar floral compositions between these samples and samples collected near Palmer Peninsula by other investigators, suggests that the similar distributional pattern may be common in other regions of Antarctica. (Auth. mod.)

B-46305

Hayward, P.J., **Some antarctic and sub-antarctic species of Celleporidae (Bryozoa, Cheilostomata),** *Journal of zoology,* Feb. 1992 226(2), p.283-310, 19 refs.

Sixteen species of cheilostome Bryozoa, within the family Celleporidae Busk, 1852, are reported from Antarctica and the subantarctic southwest Atlantic. Nine new species are described in the genera *Osthimosia* Jullien, 1888, *Celleporina* Gray, 1848 and *Turbicellepora* Ryland, 1963. *Spigaleos* gen. nov. is introduced for *Cellepora hornerоides* Waters, 1904. (Auth.)

B-46306

Clarke, A., Holmes, L.J., Gore, D.J., **Proximate and elemental composition of gelatinous zooplankton from the southern ocean,** *Journal of experimental marine biology and ecology,* Feb. 1992 15(1), p.55-68, 38 refs.

Proximate composition and elemental (C,H,N) composition of eight gelatinous zooplankton from the southern ocean were analyzed (2 ctenophores, 1 anthomedusan, 2 siphonophores, 1 scyphozoan, 1 annelid and 1 salp). In all species except the annelid *Tomopteris,* water contents were very high and the dry matter contained significant residual water (estimated to be at least 10%). The dry matter had a very high ash content (60-73%). These data are typical of gelatinous zooplankton. The major organic component was protein (0.32-0.83% wet mass, equivalent to 7.5-17.0% dry mass). Lipid was the next most abundant component (0.08-0.22% wet mass; 1.8-4.6% dry mass), similar to levels reported previously for southern ocean gelatinous zooplankton but lower than typical arctic values. Measured carbohydrate contents were 0.02-0.08% wet mass (0.4-1.7% dry mass), although stoichiometric considerations suggested the presence of an unmeasured or underestimated non-protein nitrogenous component which may be either a glycoprotein or an amino-polysaccharide. *Tomopteris* was intermediate in composition between typical gelatinous species and non-gelatinous species such as crustaceans. Unresolved difficulties over the residual water content and the nature of the unmeasured organic component mean that valid energy contents cannot be calculated from proximate composition or carbon content. (Auth.)

B-46309

Weimerskirch, H., Stahl, J.C., Jouventin, P., **Breeding biology and population dynamics of King Penguins *Aptenodytes patagonica* on the Crozet Islands,** *Ibis,* Apr. 1992 134(2), p.107-117, 31 refs.

Among King penguins at Possession I., one of the Crozet Is., the length of the moult period, pre-laying period, incubating and brooding shifts were highly variable according to the year and to the stage of the breeding season. The moulting period was shorter in late breeders than in early breeders. Only half of the birds which successfully reared a chick bred the following cycle, but late in the season. Almost all these late breeders were unsuccessful. The reasons for the high variability in the breeding pattern observed in this species between years, as well as between colonies and between individuals, are discussed. Breeding success was on average 30.6% and survival during the first year at sea could reach 50%. The survival of adult birds has increased during the past 10 years from 90.7% to 95.2% per annum. Despite an almost biennial breeding frequency and a very high rate of chick loss during the winter fast, the King penguin population of Possession I. has doubled between 1966 and 1985 due to a high survival rate of adult and immature birds. The increase during the last decade in adult survival and in adult and chick condition suggests that the population increase could be the result of an improvement in food availability. (Auth.)

B-46310

Cherel, Y., Ridoux, V., **Prey species and nutritive value of food fed during summer to King Penguin *Aptenodytes patagonica* chicks at Possession Island, Crozet Archipelago,** *Ibis,* Apr. 1992 134(2), p.118-127, 37 refs.

The diet of King penguins at Possession I. was studied in Feb. 1989 by analysis of 20 stomach contents collected from adult birds, just before they fed their single chicks. The mean mass of the samples was 1.84 kg, equivalent to 15% of the unladen adult body-mass. Fish accounted for 99.8% and squid for 0.2% by mass. The main prey were mesopelagic myctophid fish which live in dense shoals and perform a daily vertical migration. Subadults/adults of *Electrona carlsbergi* and juveniles and subadults/adults of *Krefftichthys anderssoni* represented 73.7 and 13.4% of the diet by mass, respectively. No difference was found in the diet of male and female King penguins. Comparison of individual samples suggests that these birds catch a large quantity of fish from only a limited number of shoals. The mean caloric content of the food was 7 kJ/g wet mass. The total energy requirement of each chick during its initial period of growth was estimated to amount to 328,000 kJ, equivalent to 55 kg of food. The rate at which energy was delivered to the chick was calculated to be 50 W during this period. (Auth.)

B-46312
Priscu, J.C., Sharp, T.R., Lizotte, M.P., Neale, P.J., **Photoadaptation by phytoplankton in permanently ice-covered antarctic lakes: response to a nonturbulent environment,** *Antarctic journal of the United States,* 1990 25(5), p.221-222, 5 refs.

Background information is presented on the vertical and temporal distribution of phytoplankton photosynthesis and biomass in Lake Bonney, which is permanently covered with about 4 m of ice. Diel vertical profiles of photosynthesis measured during Dec. 1989 showed 3 distinct maxima (presented in a figure); the highest rates occurred just beneath the 4.2 m ice cap, followed by peaks at 10 and 17-18 m. The integrated water-column photosynthesis rates were closely correlated with solar irradiance reaching the lake. This trend in diel photosynthesis was similar during experiments conducted in Nov. and Jan., as shown in a table.

B-46313
Lizotte, M.P., Priscu, J.C., **Photosynthesis-irradiance relationships in phytoplankton from Lake Bonney,** *Antarctic journal of the United States,* 1990 25(5), p.223-224, 9 refs.

To obtain the first precise photosynthesis-irradiance curves for phytoplankton from a dry valley lake, measurements of the curves, particulate chlorophyll *a* concentrations, and profiles of irradiance (photosynthetically available radiation, 400-700 nm) were obtained in Lake Bonney during the 1989-1990 field season. Photosynthesis-irradiance characteristics are summarized in a table, and representative plots are presented in a figure. Rates varied more than 6-fold for Pmax, and more than 18-fold for chlorophyll *a;* both were greater at 10 and 17 m than at 5 and 6 m.

B-46314
Neale, P.J., Priscu, J.C., **Structure and function of the photochemical apparatus in the phytoplankton of ice-covered Lake Bonney,** *Antarctic journal of the United States,* 1990 25(5), p.224-225, 8 refs.

Phytoplankton were collected through a hole drilled in the center of the east lobe of Lake Bonney at depths of 5-17 m. The study addresses the physiological basis for photoadaptation, given the possible benefit to the phytoplankton of fine-tuning the photochemical apparatus to the lake's light intensity and spectral range. Preliminary results suggest that Lake Bonney phytoplankton do not entirely conform to a model of shade adaptation, and point to the importance of other mechanisms. The shallow populations exist in conditions of highest light level, but lowest temperature and nutrient concentrations, in the Lake Bonney water column. It is suggested that, although the physiological mechanism for depression of photosystem II quantum yield by nutrient starvation or low temperature is not clear, such metabolic stress factors may limit the extent of photoadaptation.

B-46315
Sharp, T.R., Priscu, J.C., **Ambient nutrient levels and the effects of nutrient enrichment on primary productivity in Lake Bonney,** *Antarctic journal of the United States,* 1990 25(5), p.226-227, 5 refs.

Lake Bonney is divided into two lobes by a narrow, shallow channel, and in many respects each lobe could be considered a separate, distinct water body. Each lobe has different vertical profiles for temperature and conductivity. In this article, the nutrient distributions of the east and west lobes, and results from preliminary experiments suggesting nutrient deficiency in the surface phytoplankton populations in the east lobe collected during the austral spring and summer, 1989-1990, are reported. Preliminary results show that large vertical gradients in nutrients exist, and that these nutrient gradients appear to have a role in the regulation of primary productivity in Lake Bonney.

B-46316
Spigel, R.H., Sheppard, I.V., Priscu, J.C., **Temperature and conductivity finestructure from Lake Bonney,** *Antarctic journal of the United States,* 1990 25(5), p.228-229, 5 refs.

Limited and preliminary finestructure and microstructure profiling of temperature and conductivity yielded no evidence of turbulence or mixing in the central part of the east lobe of Lake Bonney in Jan. 1990, although evidence of possible mixing was found in the narrows. Microstructure measurements from the west lobe were not of satisfactory quality to enable judgements to be made regarding mixing in that basin, although finestructure and salt concentration measurements indicated stability throughout the water column in the west lobe as well. No profiles were measured in either basin during the period of peak meltwater runoff in late Dec., however, and it is possible that inflows may generate regions of turbulence in the lake for limited periods during that time.

B-46317
Freckman, D.W., Virginia, R.A., **Nematode ecology of the McMurdo Dry Valley ecosystems,** *Antarctic journal of the United States,* 1990 25(5), p.229-230, 6 refs.

The objective of this study is to examine the distribution and trophic structure of antarctic nematode communities. Nematodes will be related to aspects of the soil physical and chemical environment and to soil microbial densities to determine the biotic and abiotic factors that affect and/or limit dry valley soil fauna. Sites spanning the lengths of Taylor, Garwood, and Wright valleys and a site at Cape Royds, Ross I., were sampled during Jan. 1990. These sites represent a diversity of soil types and variations in soil moisture. Nematode numbers were highly variable across sites and no nematodes were extracted from 44% of the samples. The maximum nematode density (8,340/kg dry soil) was for an ornithogenic soil sample from Cape Royds. In the McMurdo Dry Valleys, the maximum density for an individual sample was 2,900/kg dry soil. Mean nematode density was lower in the dry valleys than at Cape Royds. Across all sites, bacterial feeders were the dominant trophic group, comprising 66-100% of the nematode community.

B-46318
Howes, B.L., Smith, R.L., **Sulfur cycling in a permanently ice-covered amictic antarctic lake, Lake Fryxell,** *Antarctic journal of the United States,* 1990 25(5), p.230-233, 11 refs.

The present sulfur balance of the anoxic basin of Lake Fryxell suggests a system in near equilibrium with sulfate inputs. The rate of apparent sulfur oxidation near the oxycline suggests, however, that the potential must also be determined for the removal by oxidation of sulfide via anoxygenic photosynthesis and/or the precipitation of metal sulfides below the interface. In addition, the estimated rates of sulfate reduction relative to sulfur burial and upward diffusion of sulfide indicate the need to quantify water-column sulfate reduction and the areal extent of sediment sulfate-reducing activity within the lake.

B-46319

Smith, R.L., Howes, B.L., **Bacterial biomass and heterotrophic activity in the water column of an amictic antarctic lake,** *Antarctic journal of the United States,* 1990 25(5), p.233-235, 14 refs.

The biogeochemical processes affecting the carbon, nitrogen, and sulfur cycles in Lake Fryxell were studied, including enumeration and characterization of the total microbial populations within the lake. It was found that, in general, the microbial populations were physiologically stressed. The adenylate energy charge values for planktonic microorganisms throughout most of the depth profile were 0.5-0.6, indicative of a starving or extremely stressed metabolism. There were 2 depths in the lake in early Dec. 1987 that exhibited energy charge values characteristic of actively growing populations of microorganisms. A 7 m peak in energy charge correlated with the lowest bacterial abundance in the entire water column; at 9.5-10.0 m, the bacteria in the turbidity maximum were also actively growing. In addition, these organisms demonstrated the greatest heterotrophic activity within the water column.

B-46354

Hubold, G., **Ecology of the fish in Weddell Sea** [Zur Ökologie der Fische im Weddellmeer], *Berichte zur Polarforschung,* 1992 No.103, 157p., In German with English summary. Refs. p.142-157.

The environmental conditions in the Weddell Sea are characterized by low, but constant water temperature and a pronounced seasonality of light and sea-ice conditions. In addition to these factors, a markedly stable current system and sea-ice drift pattern, strong summer stratification by melting ice and advection, and a clear water mass separation over the continental shelf and slope are important environmental features in the ecology of fish. Most Weddell Sea fish species are characterized by an extremely sluggish behavior. In comparison with a moderately active boreal fish, the antarctic counterpart moves 10 to 100 times less frequently. In spite of this passive way of life, sensory capacity is well developed and the fish are capable of fast reactions and learning in captivity. This typical behavior can be interpreted as an effect of low temperature on muscle physiology. It is, however, also a very efficient adaptation to an environment of low and sporadic food supply of mainly advected or actively moving particles. The Weddell Sea shelf fish build up a biomass of only 0.1 to 1 g/sq m, with a decreasing tendency from northeast to southwest. Estimated overall production is in the order of 0.5 t/sq km/yr. In spite of this low biomass and production, fish play an important role in the high antarctic food web. Due to the lack of krill, fish are the principal food resource of most top predators, especially Emperor penguins and Weddell seals. (Auth. mod.)

B-46355

Jacob, A., **Physiology and ultrastructure of the antarctic green alga *Prasiola crispa* ssp. *antarctica* subjected to osmotic stress and desiccation** [Physiologie und Ultrastruktur der antarctischen Grünlage *Prasiola crispa* ssp. *antarctica* unter osmotischen Stress und Austrocknung], *Berichte zur Polarforschung,* 1992 No.102, 143p., In German with English summary. Refs. p.107-119.

Following 14 days of hypoosmotic culture (0.35 and 17 per mill) rates of growth, photosynthesis and dark respiration remained almost unchanged. Similarly, the intracellular ionic content was little affected, and the organic osmolyte content was only slightly reduced. Turgor pressure increased up to ca. 2.1 MPa, but the strong cell walls prevented the cells from rupturing. No obvious change in ultrastructure was seen. The single chloroplast occupied most of the protoplast volume. After prolonged periods of hypoosmotic treatment (1 to 3 months) the numerous starch granules in the chloroplast became larger. No obvious damage could be seen after hypoosmotic cultivation for several months, or after returning such cultures back to control media (35 per mill). Fourteen days cultivation in hypersaline media (70 and 175 per mill) resulted in a decrease of growth, photosynthesis and dark respiration. After transfer back to 35 per mill these parameters quickly returned to control rates. Photosynthesis and dark respiration declined immediately after emersion and rates were restored soon after reimmersion. Thalli survived 14 days of storage in 50% rel. humidity, but the growth rate in the following culture was reduced. If the water loss was not greater than 90% of total cell water, no obvious damage occurred. The ultrastructure of the cells, especially the membranes, were apparently not injured by water loss. The outer cell walls have a "false cuticle", which is obviously deposited from lipophilic globules in the cytoplasm. (Auth. mod.)

B-46358

Barrera Oro, E.R., Casaux, R.J., **Age estimation for juvenile *Notothenia rossii* from Potter Cove, South Shetland Islands,** *Antarctic science,* June 1992 4(2), p.131-136, 28 refs.

Scales and whole otoliths were used for age estimation of juvenile *Notothenia rossii* specimens collected at Potter Cove between 1983 and 1988. Results from the analysis of both types of material showed 96.7% agreement. Likewise, the examination of otolith cross sections of chosen specimens confirmed in all the cases the age readings obtained from the second whole sagittal otolith. Although the commonly accepted July 1 was used as the birth date of the fish for age calculations, data indicate that Oct. 1 is closer to the biological birth date. The length-age range of the fish was 18-44 cm and 3-7 years respectively. A comparison between observed and back-calculated mean length of age group 3 (24.6 and 25 cm respectively) indicated that not only the larger fish but the full size range of this age group was represented. Mean length data at age presented here are similar to those reported for fish from Admiralty Bay, but differ from those of fish caught off Elephant I. The use of whole otoliths for age estimation of juvenile *N. rossii* proved to be a reliable method. However, this might not be an appropriate technique for adult specimens. (Auth.)

B-46359

Barthel, D., Gutt, J., **Sponge associations in the eastern Weddell Sea,** *Antarctic science,* June 1992 4(2), p.137-150, Refs. p.147-148.

About 1500 photographs from three different areas along the eastern Weddell Sea shelf and slope were analyzed with respect to their sponge fauna; 34 sponge taxa were identified. Cluster and multidimensional scaling analysis showed the sponges to belong to different associations. Spatial extension of the associations is judged to be between several hundred m and about 2 km. A deeper association (390-1125 m) on predominantly muddy substrates along a transect at Halley Bay is characterized by four opportunistic demosponge species; a second association on harder substrate in shallower depths (99-225 m) off Cape Norvegia is more diverse, with hexactinellids as one dominant component. A third cluster, comprising both Halley Bay and Cape Norvegia stations (458-626 m), is dominated by four species which constitute a subcluster within the Cape Norvegia sponge association. Densities vary strongly within clusters and in between geographically close stations. The species associations are related to different substrates, not to depth. Within single stations most species are patchily distributed. Both association structure and species distribution within single stations can be explained on the basis of the biology of the single sponge species. (Auth.)

B-46360

Focardi, S., Lari, L., Marsili, L., **PCB congeners, DDTs and hexachlorobenzene in antarctic fish from Terra Nova Bay (Ross Sea),** *Antarctic science,* June 1992 4(2), p.151-154, 27 refs.

Chlorinated hydrocarbons were measured in 7 species of antarctic fish *(Pagothenia bernacchii, P. hansoni, Trematomus centronotus, T. newnesi, Chionodraco hamatus, Cygnodraco mawsoni* and *Gymnodraco acuticeps)* from the Ross Sea. Hexachlorobenzene (HCB), *pp'* DDT and its derivatives DDE and DDD, and about 20 congeners of polychlorinated biphenyls (PCBs) were found in muscle and liver. Levels of *pp'* DDE were positively correlated with body length in *P. bernacchii* and the plot of concentrations showed higher values in males than females of the same body weight class. The results confirm the presence of these chlorinated hydrocarbons in the antarctic marine food chain, and an increase of PCBs with respect to DDTs. The "fingerprint" of *C. hamatus* is different from that of other antarctic organisms and of fish from other parts of the world, suggesting possible metabolic differences. (Auth.)

B-46361

Franzmann, P.D., Rohde, M., **Characteristics of a novel, anaerobic, mycoplasma-like bacterium from Ace Lake, Antarctica,** *Antarctic science,* June 1992 4(2), p.155-162, Refs. p.161-162. For another version see B-46251.

An obligately anaerobic bacterium that lacked a cell wall was isolated from the hypolimnion of Ace Lake. Cells were very pleomorphic, forming cocci, filaments up to 25 microns in length, and annular shapes. The organism was morphologically very similar to some members of the class Mollicutes which contains two genera of obligately anaerobic bacteria, *Anaeroplasma* and *Asteroleplasma.* Like members of the class, the isolate was resistant to high concentrations of penicillin. Similar to *Anaeroplasma,* the organism had a low DNAG+C content (29.3 +/- 0.4) and produced hydrogen, carbon dioxide, acetic acid, lactic acid and succinic acid from the fermentation of glucose. However, the taxonomic status of the strain remained unclear as, unlike members of the class Mollicutes, the isolate had a relatively large genome size , did not pass through 0.45 micron pore size filters, and did not form typical mycoplasma-like colonies. The organism was psychrophilic with an optimum temperature for growth between 12 C and 13 C. A phenotypic description of the organism is given and the ecological role of the organism is inferred from its phenotype and the characteristics of its antarctic habitat. (Auth.)

B-46362

Gudmundsson, G.A., Alerstam, T., Larsson, B., **Radar observations of northbound migration of the Arctic tern, *Sterna paradisaea,* at the Antarctic Peninsula,** *Antarctic science,* June 1992 4(2), p.163-170, 22 refs.

An intensive migration of arctic terns was observed from Mar. 7-9, 1989 in Marguerite Bay. The movement pattern and speed of tern flocks were analyzed from time-lapse films of a marine navigation radar. The terns migrated north at altitudes 30-60 m asl along the inner coast of Marguerite Bay. When approaching Pourquois Pas I., the majority veered to the NNE flying into Bourgeois Fjord. Mean flock size was 11.6 (s.e.=1.9). The estimated total during the 3 observation days was about 7600 migrating terns. Analyzing flight speed in relation to wind showed that the terns increased their airspeed when flying into headwinds and decreased it with following winds. It is suggested that the terns were migrating on a connecting route between the pack ice of the Bellingshausen and Weddell seas, involving a flight across the Antarctic Peninsula. Topographical conditions are favorable for such a passage close to the observation site in Marguerite Bay, where the distance across the 1500 m high ice cap of the Antarctic Peninsula is only 37 km. (Auth. mod.)

B-46363

Klöser, H., **Adjustment of anisakid nematode life cycles to the high antarctic food web as shown by *Contracaecum dadiatum* and *C. osculatum* in the Weddell Sea,** *Antarctic science,* June 1992 4(2), p.171-178, Refs. p.177-178.

The infestation of Weddell seals and several fish species by the anisakid nematodes *Contracaecum osculatum* and *C. radiatum* was compared. Nematode numbers in Weddell seal stomachs ranged from 30,560 to 122,640. Third stage larvae from seals and fish were separated into a short and a long type. The short type was related to *C. radiatum* and the long type to *C. osculatum.* The short type was more abundant in pelagic fish species, whereas the long type prevailed in benthic fish species. Fish-feeding channichthyids *Cryodraco antarcticus* and *Contracaecum* seemed to play an important role as paratenic hosts for the third stage larvae of both *Contracaecum* species. Different advantageous and detrimental features of a benthic versus a pelagic life cycle under high antarctic ecological conditions are discussed. Varying abundance of the two nematode species in hosts may be controlled by differences in their life cycles, which follow either a pelagic or a benthic food web. Crucial importance is thus given to the local availability of pelagic versus benthic food resources for Weddell seals. (Auth.)

B-46364

McClintock, J.B., Gauthier, J.J., **Antimicrobial activities of antarctic sponges,** *Antarctic science,* June 1992 4(2), p.179-183, Refs. p.182-183.

Methanol-toluene extracts of 17 common antarctic marine sponges collected from shallow waters in McMurdo Sound in Oct.-Dec. 1989 were tested for suppression of growth of bacteria (gram-positive and negative), yeasts and fungi. Weak to moderate levels of antimicrobial activity occurred in all sponges. Antimicrobial activity was more common when gram-negative bacteria were exposed to sponge extracts; 47% of the sponge extracts caused growth inhibition in one or more gram-positive bacteria, while 100% of the extracts caused growth inhibition in gram-negative bacteria. Particularly strong activity was observed against two species of gram-positive bacteria exposed to extracts of the sponge *Haliclona* sp. Antimicrobial responses against yeasts and fungi were generally non-existent or weak, with the exception of the yeast *Candida tropicalis,* which was strongly inhibited by extracts of several sponges. Antimicrobial activity in these polar sponges is widespread but generally weaker than that found in temperate and tropical sponges. (Auth.)

B-46365

Roser, D.J., Melick, D.R., Seppelt, R.D., **Reductions in the polyhydric alcohol content of lichens as an indicator of environmental pollution,** *Antarctic science,* June 1992 4(2), p.185-189, 17 refs.

Levels of polyhydric alcohols and oligosaccharides in the lichens *Umbilicaria decussata* and *Usnea sphacelata* were measured in samples obtained from unpolluted and polluted sites on Bailey Peninsula. Undisturbed lichen possessed levels of these compounds (33 and 20 mg/g dry weight respectively) typical of those found in lichens from temperate climates. Plants from sites severely polluted by alkaline cement dust, derived from concrete mixing activities, possessed significantly lower levels $(P<0.01)$ of these intracellular constituents. Levels of chlorophyll *a* in *U. decussata* were significantly correlated with total polyols+sugars. It is suggested that environmental impacts on antarctic vegetation may be measured by parallel determinations of these two parameters on sensitive lichen species such as *U. decussata.* (Auth.)

B-46366

Sancho, L.G., Kappen, L., Schroeter, B., **Lichen genus *Umbilicaria* on Livingston Island, South Shetland Islands, Antarctica,** *Antarctic science,* June 1992 4(2), p.189-196, Refs. p.195-196.

Five species of *Umbilicaria* are described, three of which, *U. africana, U. krascheninnikovii* and *U. nylanderiana,* have not been previously recorded from Antarctica. Distributed patterns and morphological characteristics of these species are discussed. (Auth.)

B-46367
Zdzitowiecki, K., White, M.G., **Acanthocephalan infection of inshore fish in two fjords at South Georgia,** *Antarctic science,* June 1992 4(2), p.197-203, Refs. p.202-203.

An examination of 111 fish of 8 species, including 92 immature *Notothenia rossii* Richardson revealed 9 acanthocephalan species, including 4 Echinorhynchida, occurring in the alimentary tract and 5 Polymorphida in the body cavity. Echinorhynchida were much more numerous, especially *Metacanthocephalus johnstoni* Zdzitowiecki (the dominant species) and *Aspersentis megarhynchus* (Linstow). The Polymorphida parasites of seals were more abundant than species parasitic in birds. Association of most of species with the inshore (fjord) environment was confirmed. The species diversity, prevalence and density of infection increased with the size of immature *N. rossii.* Differences in acanthocephalan occurrence and changes with time are related to differences in host distribution and abundance. For example, the occurrence of *C. arctocephali* in *N. rossii* at South Georgia is related to the increase of the fur seal population. A list of acanthocephalans in fish at South Georgia and the South Shetland Is. (14 species in total) is included. (Auth.)

B-46368
Greenfield, L.G., **Retention of precipitation nitrogen by antarctic mosses, lichens and fellfield soils,** *Antarctic science,* June 1992 4(2), p.205-206, 9 refs.

This short note reports the results of work designed to show that fellfield soils and plants may obtain most of their N from atmospheric precipitation. A table is presented showing mean percentage recovery and retention, by location, of ammonium nitrate nitrogen added to antarctic mosses, lichens and fellfield soils.

B-46377
Siegel, V., Skibowski, A., Harm, U., **Community structure of the epipelagic zooplankton community under the sea-ice of the northern Weddell Sea,** *Polar biology,* Apr. 1992 12(1), EPOS European Polarstern.Study, Proceedings. No.1, p.15-24, Refs. p.23-24.

The composition, abundance, biomass and diversity of the meso- and macrozooplankton in the epipelagic zone of the open water and under the ice of the northern Weddell Sea are described. There is no basis for the separation into communities, but differences occur on the population level in numerical abundances, biomass (wet weight) and in a shift in species dominance. Different ice zones and vertical layers were tested with regard to their relative species abundance. Significant differences were found between the upper 60 m layer of the open sea, the upper 60 m layer of the closed pack-ice and the so-called transitional zone. Species richness and diversity were lowest directly under the closed pack-ice. Abundance and biomass were highest in the surface layer of the open water, while both variables decreased dramatically under the ice. Copepods dominated numerically in open water, while salps dominated in biomass. *Euphausia superba* and *Thysanoessa macrura* were the dominant species in the upper water column of the closed pack-ice zone. Krill was the only species with increasing abundance in the sub-ice area, and a dominance in biomass of more than 91% demonstrated its unique importance for the sub-ice habitat. (Auth. mod.)

B-46379
Estrada, M., Martinez, R., Mathot, S., **Respiratory electron transport activity in plankton of the Weddell and Scotia Seas during late spring- early summer: relationships with other biological parameters,** *Polar biology,* Apr. 1992 12(1), EPOS European Polarstern.Study, Proceedings. No.1, p.35-42, Refs. p.41-42.

As a means to estimate potential oxygen consumption, profiles of electron transport system (ETS) activity were made along three transects across the Weddell-Scotia Confluence zone (WSC) and the marginal ice zone. The temporal changes in the overall distribution of ETS activity were small compared with the spatial variations. The main feature of the ETS activity distribution was the presence of maxima located in the WSC, coinciding with peaks of phytoplankton biomass. Different relationships between ETS and chlorophyll *a* concentration in these maxima appeared to be related to diatom or flagellate dominance. Vertically integrated ETS activities were significantly correlated with chlorophyll *a* and particulate organic carbon concentrations, primary production, and bacterial thymidine uptake. (Auth. mod.)

B-46380
Buma, A.G.J., Gieskes, W.W.C., Thomsen, H.A., **Abundance of Cryptophyceae and chlorophyll *b*-containing organisms in the Weddell-Scotia Confluence area in the spring of 1988,** *Polar biology,* Apr. 1992 12(1), EPOS European Polarstern.Study, Proceedings. No.1, p.43-52, Refs. p.51-52.

During a cruise in the Weddell-Scotia Confluence area (Nov.-Jan. 1988/1989) nanophytoplankton composition was determined by employing taxon-specific pigment measurements with HPLC. Highest cryptophyte biomass was found along the retreating ice-edge; the contribution of cryptophytes to total phytoplankton crop increased with time, reaching monospecific bloom conditions at the end of the cruise. Chlorophyll *b*-containing organisms and Prymnesiophyceae were present everywhere, and dominated in the ice-covered part of the survey area. Cryptophyte-specific pigment measurements were in reasonable agreement with cryptophyte cell numbers. Prasinophyte cell counts, however, did not match with measured chlorophyll *b* concentrations. The quantitative importance of the nanophytoplankton groups reported here underlines the diversity of the plankton in the southern ocean's marginal ice zone system, which may have implications for food chain dynamics. (Auth. mod.)

B-46381
Thomsen, H.A., Larsen, J., **Loricate choanoflagellates of the southern ocean with new observations on cell division in *Bicosta spinifera* (Throndsen, 1970) from Antarctica and *Saroeca attenuata* Thomsen, 1979, from the Baltic Sea,** *Polar biology,* Apr. 1992 12(1), EPOS European Polarstern.Study, Proceedings. No.1, p.53-63, Refs. p.62-63.

The loricate choanoflagellate *Bicosta spinifera* was observed frequently in samples collected along Scotia/Weddell Sea transects. The entire population showed a conspicuous bimodal size distribution. Large forms were predominant in Scotia Sea samples, while only small specimens were found in the Confluence area. Prior to cell division *B. spinifera* produces a complete set of costal strips in a temporary "tail"-like protrusion. Small specimens sometimes possess a "tail" similar to that found in large specimens. The fact that *B. spinifera* may increase considerably in size following cell division, in connection with the finding of aberrant minute forms, leads to the hypothesis of a polymorphic life history in *B. spinifera.* The term "caudiform" division is introduced to describe division in *B. spinifera. Saroeca attenuata* also produces a "tail" prior to cell division, but is otherwise shown to undergo a mixed caudiform/tectiform type of division. (Auth.)

B-46382
Cuzin-Roudy, J., Labat, J.P., **Early summer distribution of antarctic krill sexual development in the Scotia-Weddell region: a multivariate approach,** *Polar biology,* Apr. 1992 12(1), EPOS European Polarstern.Study, Proceedings. No.1, p.65-74, Refs. p.73-74.

In Nov. 1988, female krill from the ice covered area of the Weddell Sea had a juvenile ovary, while pelagic female krill from Scotia

Sea were in advanced previtellogenesis, and one third of them had already spawned. Successive samples from the Confluence illustrated a rapid advance of sexual development from Nov. 1988 to Jan. 1989. Observation of live krill maintained on board and the Multiple Correspondence Analysis both confirmed the general trend of distribution of sexual development in relation to size structure and environmental factors. Previtellogenesis occurs in relation to the ice-edge, while vitellogenesis is performed in short cycles in the summer pelagic habitat. The degree of sexual development attained by krill samples (measured by the sexual development index, SDI) is thus a good indicator of the biological activity of the krill population and of its impact on the pelagic ecosystems. (Auth. mod.)

B-46385

Van Franeker, J.A., **Top predators as indicators for ecosystem events in the confluence zone and marginal ice zone of the Weddell and Scotia Seas, Antarctica, Nov. 1988 to Jan. 1989 (EPOS Leg 2),** *Polar biology,* Apr. 1992 12(1), EPOS European Polarstern Study, Proceedings. No.1, p.93-102, Refs. p.101-102.

The pelagic summer distribution of antarctic seabirds, seals and whales was studied in the marginal ice zone of the northwestern Weddell Sea from Nov. 1988 to Jan. 1989. In order to relate top predators to other components of the ecosystem studied simultaneously, their distribution is mainly described in terms of energy flow. Bird, seal, and probably also whale requirements were highest in ice-covered areas. There was no evidence of higher numbers of top predators along the ice edge; densities generally increased further into the ice. In the pack ice, combined energy requirements of top predators often amounted to about 200,000 kJ/day/sq km, or about 45 kg fresh food, indicating high abundance and availability of prey under the ice. There was a lack of conformity between top predator abundance on the ice and abundance of other life in the water column below. In open water, bird requirements were generally less than 25,000 kJ/day/sq km, seals were virtually absent and whales were distributed unevenly. Tubenosed birds concentrated along the outer ice edge in early summer but they moved north to open water during Dec., leaving the area of maximum phytoplankton biomass associated with the retreating ice edge. This pattern matched northward movements of krill swarms that may be related to changes in quality rather than quantity of phytoplankton stocks. (Auth.)

B-46386

Arnaud, P.M., Hain, S., **Quantitative distribution of the shelf and slope molluscan fauna (Gastropoda, Bivalvia) of the eastern Weddell Sea (Antarctica),** *Polar biology,* Apr. 1992 12(1), EPOS European Polarstern Study, Proceedings. No.1, p.103-109, 8 refs.

A comparative analysis of the relatively rich shelled gastropod and bivalve fauna of two transects from 200 to 2,000 m in the eastern Weddell Sea was done by trawls and multibox corer. Related to the unusual shelf topography, a characteristic pattern of abundance and species richness with depth and location is evidenced. Highest values of species richness are observed near the ice-shelf edge and from the rise of the shelf to some 800 m on the slope, and lowest values between 300 and 600 m on the inner slope. This anomalous pattern, not followed by the biomass, is interpreted as a consequence of both historical factors (problems of colonization of the shelf) and present food supply. Most of the species are eurybathic and eurytopic. Generally speaking, assemblages are patchy but tend to be arranged by depth zones. (Auth.)

B-46387

Gorny, M., Arntz, W.E., Clarke, A., Gore, D.J., **Reproductive biology of caridean decapods from the Weddell Sea,** *Polar biology,* Apr. 1992 12(1), EPOS European Polarstern Study, Proceedings. No.1, p.111-120, Refs. p.119-120.

Data on reproductive biology are presented for 5 benthic caridean shrimps from the high Antarctic *(Chorismus antarcticus, Notocrangon antarcticus, Nematocarcinus lanceopes, Lebbeus antarcticus* and *Eualus kinzeri).* The first 3 species were very common on the Weddell Sea shelf and upper slope, whereas only a few individuals of the other 2 species were caught—but these did include some ovigerous females. Measurements include size at first maturity, fecundity (total number and mass of eggs), individual egg mass, egg length, ovary indices, maximum size encountered and documentation of the reproductive cycle in spring and summer. Egg number generally increases with female size, and the largest species *(N. lanceopes)* also carries the highest number of eggs. In the high Antarctic, *C. antarcticus* and *N. antarcticus* grow to a larger maximum size, attain sexual maturity later in their life cycle, and produce fewer and larger eggs in relation to both carapace length and female mass, than their subantarctic counterparts. (Auth. mod.)

B-46388

Zimmermann, A., Brandt, A., **New results of the "EPOS" leg 3 cruise to Antarctica: Horizontal and vertical distribution of isopods (Crustacea) in the eastern Weddell Sea,** *Polar biology,* Apr. 1992 12(1), EPOS European Polarstern Study, Proceedings. No.1, p.121-128, 24 refs.

A comparison of the "EPOS" leg 3 material of Weddell Sea Isopoda with the known literature data revealed some new results for the horizontal and vertical distribution of isopods in the eastern Weddell Sea. The number of isopod species known for the Weddell Sea almost doubled to 118 species. New results on the vertical distribution of 11 isopod genera are presented. (Auth.)

B-46389

Clarke, A., Gore, D.J., **Egg size and composition in *Ceratoserolis* (Crustacea: Isopoda) from the Weddell Sea,** *Polar biology,* Apr. 1992 12(1), EPOS European Polarstern Study, Proceedings. No.1, p.129-134, Refs. p.133-134.

Samples of ovigerous female *Ceratoserolis trilobitoides* carrying newly spawned eggs in the marsupium were obtained from Borge Bay, the continental shelf near Elephant I., and 2 sites in the inner Weddell Sea. The dry mass of a newly spawned egg was greater at the inner Weddell Sea sites even when the larger size of the females from the Weddell Sea and the positive relationship between egg size and female size were taken into account. Larger eggs contained more yolk, and there was a slight but significant tendency for larger eggs to have a lower percentage nitrogen content. Eggs from *Ceratoserolis meridionalis* were smaller in size than sympatric *C. trilobitoides,* but of similar composition. (Auth. mod.)

B-46390

D'Avino, R., Fago, A., Kunzmann, A., Di Prisco, G., **Primary structure and oxygen-binding properties of the single haemoglobin of the high-Antarctic fish *Aethotaxis mitopteryx* DeWitt,** *Polar biology,* Apr. 1992 12(1), EPOS European Polarstern Study, Proceedings. No.1, p.135-140, 21 refs.

The complete amino acid sequence of the single haemoglobin of the antarctic fish *Aethotaxis mitopteryx* DeWitt has been established by automated repetitive Edman degradation on the intact and cleaved (enzymatically and chemically) *alpha* and *beta* chains. A very high sequence identity with other antarctic fish haemoglobins has been detected. The haemoglobin has a moderate Bohr effect and no Root effect. Organic phosphates and chloride also regulate oxygen binding only to a moderate extent. The lack of Root effect is consistent with the substitution His-Val at the HC3 C-terminal position of the *beta* chain. The low overall heat of oxygenation suggests that in this species oxygen transport is an energy-saving process, presumably related to cold adaptation. The comparative analysis of the haemoglobins of antarctic fishes emphasizes some unique features of the oxygen-transport system of *A. mitopteryx,* which are likely to be related to its also rather unique mode of life. (Auth.)

B-46391

Kunzmann, A., Fago, A., D'Avino, R., Di Prisco, G., **Haematological studies on *Aethotaxis mitopteryx* DeWitt, a high-Antarctic fish with a single haemoglobin,** *Polar biology,* Apr. 1992 12(1), EPOS European Polarstern Study, Proceedings. No.1, p.141-145, Refs. p.144-145.

The haematological parameters of the antarctic fish *Aethotaxis mitopteryx* DeWitt are reported. The erythrocyte number and the haemoglobin concentration (27.8 g/l) were found to be among the lowest values known for red-blooded antarctic fishes. Among the species of the family Nototheniidae, this is the only one found so far to have a single haemoglobin in its blood. The results have been analyzed in comparison with those of other antarctic species, in an effort to establish correlations between the physiology of this pelagic-benthopelagic fish and its ecology. From the haematological parameters in this study and the functional properties of haemoglobin outlined in the following paper, it is suggested that *A. mitopteryx* has an extremely sluggish mode of life. (Auth.)

B-46404

Hosking, E., Sage, B., **Antarctic wildlife,** New York, Facts On File, 1982, 160p.

DLC QL106.H67

Although this is primarily a book about the wildlife of the Antarctic, the human history and geography of the area are also briefly reviewed. The text has been written to complement the numerous photographs that constitute the main bulk of this volume, showing landscapes, seascapes, seabirds, penguins and seals of the ecologically divided region: the antarctic continent, the maritime Antarctic, and the Subantarctic.

B-46405

Wägele, J.W., **Antarctic Isopoda Valvifera,** *Synopses of the antarctic benthos,* 1991 Vol.2, Theses zoologicae, Vol.14. Edited by R. Fricke, 213p., Refs. p.195-206.

DLC QL444.M34W34

The isopods considered in this monograph are those known from the area between the Antarctic Convergence, the subantarctic archipelagos and the littoral of the antarctic continent, including the deep sea of the southern ocean. The classification of the Isopoda proposed by Wägele (1989)—with families listed only for those suborders which occur in Antarctica, and the key to those suborders—is presented.

B-46406

Balushkin, A.V., **Review of green notothenias, *Gobionotothen,* Balushkin (Nototheniidae) of the Antarctic and the Subantarctic,** *Journal of ichthyology,* 1991(Pub. Mar. 92) 31(8), p.42-55, Translated from Voprosy ikhtiologii. 23 refs.

The genus *Gobionotothen* comprises 2 groups of species: the Marionensis group with the species *G. acuta* (Günther), *G. angustifrons* (Fischer) and *G. marionensis* (Günther), and the Gibberifrons group with the species *G. barsukovi* sp. n. and *G. gibberifrons* (Lönnberg). The new species differs in having a high spinous dorsal fin, in features of squamation, and in several meristic characters. Descriptions of the species and keys to their identification are given. Aspects of the evolution and dispersal of the *Gobionotothen* are discussed. (Auth.)

B-46407

Kear, A.J., **Diet of antarctic squid: comparison of conventional and serological gut contents analyses,** *Journal of experimental marine biology and ecology,* Apr. 28, 1992 156(2), p.161-178, 36 refs.

The alimentary tracts of 12 species of antarctic squid were examined visually and serologically for the presence of *Euphausia superba.* Only 4 species, *Alluroteuthis antarcticus, Galiteuthis glacialis, Martialia hyadesi* and *Psychroteuthis glacialis,* contained material which was identifiable to species visually. Myctophid fish and euphausiids were the most common prey item. Serology showed that specimens of 6 species had eaten euphausiids. Where antisera showed cross-reactions with other potential prey species, biogeographical and haul data was used to determine the species of *Euphausia* consumed. *P. glacialis* (n=19) had consumed *E. superba.* *Mastigoteuthis psychrophila* (n=10) had eaten *E. superba* and/or *E. triacantha. Brachioteuthis picta* (n=6), *M. hyadesi* (n=27), and two *Moroteuthis* spp. (n=2) had consumed unidentified euphausiids. *Bathyteuthis abyssicola* (n=13) and *Histioteuthis eltaninae* (n=13) had not preyed on euphausiids. *B. picta* appeared to have fed in the net. (Auth.)

B-46409

Brandt, A., **New Asellota from the antarctic deep sea (Crustacea, Isopoda, Asellota), with descriptions of two new genera,** *Zoologica scripta,* Jan. 1992 21(1), p.57-78, 34 refs.

Two new genera, *Reductosoma* gen.n. (Desmosomatidae) and *Desmostylis* gen.n. (Desmosomatidae), and 5 new species are described from the Maud Rise and the Gunnerus Ridge, East Antarctica. Two new species of the Desmosomatidae (Eugerdellatinae and Desmosomatinae) are described: *Reductosoma gunnera* gen. et sp.n. and *Desmosoma hesslera* sp.n.; one species of the Munnopsidae (Eurycopinae), *Disconectes colemani* sp.n.; and two species of the Macrostylidae from the antarctic deep sea, *Desmostylis obscurus* gen. et sp.n. and *Macrostylis sarsi* sp.n. Comments on the phylogeny and zoogeography are given. (Auth.)

B-46410

Perissinotto, R., **Mesozooplankton size-selectivity and grazing impact on the phytoplankton community of the Prince Edward Archipelago (southern ocean),** *Marine ecology progress series,* Jan. 1992 79(3), p.243-258, 74 refs.

Dense phytoplankton blooms are often found during austral summer and autumn in the Prince Edward Archipelago. These blooms are dominated by the large diatoms *Chaetoceros radicans* and *Rhizosolenia curvata* and by the silicoflagellate *Dictyocha speculum.* Size-selectivity experiments show that the nano-phytoplankton is preferentially selected by all taxa. Only 2 euphausiid species appear to have a significant positive selection for the smaller netplankton (20 to 37 microns). Poor utilization of these diatom blooms is also supported by the results of a comparative study of grazing impact during a bloom (Apr. 1985) and a non-bloom condition (Apr./May 1989). When phytoplankton biomass is low, the zooplankton community ingests 33 to 48% of the euphotic zone chlorophyll *a* per day, or 76 to 81% of daily primary production. However, during bloom conditions the grazing impact is reduced to only 5 to 10% of chlorophyll *a* concentration and 9 to 17% of primary production per day. Preferential selection for the smaller cells may have an energetic significance as nanoplankton seems to represent a food source of higher nutritional value than bloom-generating diatoms. It is suggested that the bulk of the phytoplankton blooms sinks out of the photic zone and provides an important transfer of biomass from the pelagic to the benthic subsystems. (Auth. mod.)

B-46411

Perissinotto, R., McQuaid, C.D., **Land-based predator impact on vertically migrating zooplankton and micronekton advected to a southern ocean archipelago,** *Marine ecology progress series,* Feb. 1992 80(1), p.15-27, 46 refs.

Vertical migration of major prey species was from 200-400 m in the day to near-surface levels at night and was linked to feeding periodicity. Consistently high winds result in drift of surface waters (down to 10-20 m) and advection of prey over the shelf. An estimated 3200 t of zooplankton and 310 t of myctophid fish were carried over the shelf every 24 h. Predators in the archipelago consume ca 900 t of crustaceans and 1700 t of fish/d. Thus, advection could supply sufficient crustaceans to the shelf area for the needs of the land-based predators, but is inadequate to support myctophid-feeding piscivores. Once over the shelf, prey attempting to migrate downwards would be trapped by bottom topography and vulnerable to predation. Prey density in shelf and oceanic waters was similar at night, but decreased dramatically over, and downstream of, the shelf in the day. Rockhopper and Macaroni penguins are the most important crustacean predators and feed mainly over the shelf, with foraging ranges of about 30 and 100 km respectively. In contrast, King penguins account for >70% of the fish consumed in the area and forage in deep waters, having an average foraging range of 300 km. This spatial segregation of the main predators is consistent with the availability of their prey. (Auth. mod.)

B-46413

Cota, G.F., **Nutrient and biogenic particulate distributions, primary productivity and nitrogen uptake in the Weddell-Scotia Sea marginal ice zone during winter,** *Journal of marine research,* Feb. 1992 50(1), p.155-181, 52 refs.

During austral winter of 1988, the distributions of inorganic nutrients and particulate materials as well as primary productivity and rates of nutrient uptake in the upper 150 m of the marginal ice zone of the Weddell-Scotia Sea were determined. Nutrient concentrations were high and particulate matter levels were low throughout the study area, but occasionally nutrient minima and particulate maxima occurred near the ice edge associated with warm-core eddies. Chlorophyll concentrations and primary productivity averaged 0.12 microgram/l and 32 mg C/sq m/d, respectively. Surface growth rates calculated from carbon uptake and total particulate organic carbon were very low, but living phytoplankton only comprised about 10% of the POC in the surface layer. Thus, mean phytoplankton growth rates appear to have been between 0.1 and 0.2 doublings/d. Although nitrate was about 40 times as abundant as ammonium, ammonium was consistently the preferred substrate of the plankton assemblages, accounting for over half of the nitrogen taken up. Paired samples from the same depth and vertically integrated *f*-ratios averaged 0.43. Both ammonium and nitrate were removed at rates that individually exceeded the apparent nitrogen demand of the phytoplankton, implying significant heterotrophic uptake of inorganic nitrogen. (Auth. mod.)

B-46416

Hansson, L.A., **Role of food chain composition and nutrient availability in shaping algal biomass development,** *Ecology,* Feb. 1992 73(1), p.241-247, 44 refs.

With the aim of assessing the principal structuring forces for algal biomass development, field studies were conducted along a productivity gradient of Swedish and antarctic lakes. The regression line of planktonic algal biomass *vs.* the concentration of total phosphorus shows a steeper slope for Swedish (functionally three trophic levels) than for antarctic lakes (functionally two trophic levels). This difference suggests that, besides the effect of nutrients, the food chain composition in aquatic systems has a crucial impact on the biomass development of planktonic algae. However, at very high productivity, phytoplankton biomass in the antarctic lakes approached levels similar to those in Swedish lakes, suggesting that the algae "grew away" from being grazer regulated and instead became nutrient limited. The mechanistic connections between the components in the food chain, suggested by theory and the descriptive field study, were evaluated in an enclosure experiment. It may be concluded that classical food chain theory can explain a great deal of the variation in the relation between phosphorus concentration and phytoplankton chlorophyll, frequently used by limnologists. (Auth. mod.)

B-46417

Kooyman, G.L., **Diving behavior and energetics during foraging cycles in King Penguins,** *Ecological monographs,* Mar. 1992 62(1), p.143-163, 72 refs.

King penguins are the second largest of all diving birds and share with their congener, Emperor penguins, breeding habits strikingly different from other penguins. The purpose of the study was to determine the feeding behavior, energetics of foraging and the prey species, and compare these to other sympatric species of subantarctic divers. These characteristics were determined: (1) general features of foraging behavior using time-depth recorders, velocity meters, and radio transmitters, (2) energetics by doubly labeled water, (3) food habits and energy content from stomach lavage samples, and (4) resting and swimming metabolic rate by oxygen consumption measurements. Details of these determinations are provided in terms of penguin sizes, diving frequencies and depths, swimming behavior, energy consumption and intake, primary prey, and foraging success. It was concluded that: (1) feeding begins about 28 km from the colony, (2) prey is pursued night and day through its vertical movements, (3) vertical distribution of the prey is reflected closely by diving habits of the birds, (4) deep-diving, for unknown reasons, is an important component of foraging success, (5) diving capacities of King penguins are remarkable compared to other birds and many pinnipeds, and (6) calculated foraging energetics can be closely estimated from time-energy budgets. (Auth. mod.)

B-46420

Hartmann-Schröder, G., **Contribution to the polychaete fauna of Bahia Quillaipe (Chile)** [Beitrag zur Polychaetenfauna der Bahia Quillaipe (Süd-Chile)], *Helgoländer Meeresuntersuchungen,* 1991 45(1-2), p.39-58, In German with English summary. 36 refs.

Nineteen species were found; 2 of them are new to science *(Scolelepis brevibranchia, Scolelepis crenulata).* Additional descriptions of the parapodial lobes of the little-known species *Aglaophamus peruana* are given. *Hemipodus heteropapillatus* and *Cirriformia quetalmahuensis,* described in 1962 as new species, were found again. Two species could not be determined as to species level; one of them, *Euclymene (E.)* sp., may also be a new species. Four of the 15 already known and determined species are widely distributed. Another 4 species occur in the southern part of the Southern Hemisphere: South America, Australia, New Zealand and in the subantarctic and antarctic region. Six species are known only from the cold water coasts of South America (Humboldt and Falkland Currents). *Exogone obtusa tasmanica, Lumbrineris patagonica* and *Spiochaetopterus costarum* are recorded from Chile for the first time. (Auth. mod.)

B-46421

Kapp, H., **Redescription of *Heterokrohnia mirabilis* Ritter-Záhony, 1911 (Chaetognatha),** *Helgoländer Meeresuntersuchungen,* 1991 45(1-2), p.253-262, 10 refs.

The genus *Heterokrohnia* Ritter-Záhony, 1911 is redefined and the species *H. mirabilis* Ritter-Záhony, 1911 redescribed. The redescription is based upon the type specimens from antarctic waters and additional specimens from Atlantic and arctic waters. The species is compared to others of the genus. Furthermore, the identity of certain specimens reported as *H. mirabilis* is discussed. (Auth.)

B-46424
Seppelt, R.D., **Ditrichum subaustrale var. robustum Card., is a Dicranoweisia,** *Journal of bryology,* 1991 16(4), p.607-610, 4 refs.

The presence of a conspicuous group of alar cells precludes *Ditrichum subaustrale* var. *robustum* from *Ditrichum* and accordingly it is transferred to *Dicranoweisia* as *Dicranoweisia antarctica* var. *robustum* (Card.) Seppelt, comb. nov. (Auth.)

B-46443
Zhang, H.S., Xia, W., Cheng, X., Zhu, B., **Study of fluoride anomaly in antarctic krill,** *Antarctic research (Chinese edition),* Dec. 1991 3(4), p.24-30, In Chinese with English summary. 8 refs.

Investigation of the existing form and the partitioning pattern of fluoride in krill *(Euphausia superba)* is discussed. The potential accumulation mechanism, and the effect of fluoride in krill on the geochemical characteristics of fluoride in the antarctic ecoenvironment, are also considered. Results of the study show that the amount of fluoride in various parts of krill varies considerably. Most of it is concentrated in the carapace, head and legs: 4028, 2724 and 2828 micrograms/g, respectively. The muscle contains the least fluoride: 226 micrograms/g. Fluoride content in the whole freeze-dried krill averages 1232 micrograms/g. It is suggested that, since the variation and enrichment of fluoride is related closely to such elements as P and Ca, fluoride in krill's carapace is likely to exist in the form of inorganic salt with P and Ca. The study also shows a slightly higher fluoride concentration in seawater, and lower in sediment, attributed to the huge storage of krill in the area investigated.

B-46444
Zhu, G., Li, R., **Study of nano- and microalgae in adjacent waters of Antarctica. 2. Distribution characteristics of planktonic nano- and microdinoflagellates in adjacent waters of the South Shetland Islands.,** *Antarctic research (Chinese edition),* Dec. 1991 3(4), p.31-41, In Chinese with English summary. 8 refs.

Species composition, quantitative distribution, and community structure characteristics of planktonic nano- and microdinoflagellates were investigated in samples collected from 28 stations, in waters of South Shetland Is., from Jan. 17 to Feb. 2, 1987. Forty seven species, belonging to 11 genera, are identified. The dominant species are: *Gyrodinium lachryma, Protoperidinium archiovatum, P. antarcticum, Gymnodinium baccatum, G. frigidum,* and *P. metananum.* The mean cell density of net planktonic nano- and microdinoflagellates, and the mean cell density in surface waters, are shown in tables. There is a positive correlation between density and water temperature. Most of the species identified are endemic to Antarctica, with mass reproduction in extremely cold waters.

B-46452
Wang, Z., **Ecology of Catharacta maccormicki near Zhongshan Station in Larsemann Hills, East Antarctica,** *Antarctic research (Chinese edition),* Sep. 1991 3(3), p.45-55, In Chinese with English summary. 9 refs.

Ecological and biological studies of the south polar skua *Catharacta maccormicki* near Zhongshan Station, in Larsemann Hills, carried out during Jan. 1989-Feb. 1990, are reported. The Larsemann Hills also provide breeding sites for other seabirds, such as the snow petrel *Pagodroma nivea* and Wilson's storm petrel *Oceanies oceanicus,* which nest mainly in the eastern part of the Hills. During observation of 15 skua nests, 7 skua pairs exploited and defended their feeding territories located in areas with high density of snow petrel distribution. These pairs of skuas depended less for food from the Station's waste than those who had no feeding territory and foraged mostly in the vicinity of the Zhongshan Station. The skuas arrived at the study area in Oct. for their reproductive activities. The first egg was laid in mid Nov.; most eggs followed in late Nov.-early Dec. The chicks hatched after 25-27 days of incubation. (Auth. mod.)

B-46468
Woehler, E.J., **Distribution, abundance and status of Adélie penguins Pygoscelis adeliae at the Windmill Islands, Wilkes Land, Antarctica,** *Marine ornithology,* 1991 19(1), p.1-18, 19 refs.

The total breeding population of Adélie penguins *Pygoscelis adeliae* on Windmill Is. in 1989/90 was 93,092 +/- 9,300 pairs at 14 breeding localities. The population has apparently increased by 209% since a survey in the early 1960s, a trend that is shared with many other breeding localities where long-term data are available. Relict colony areas (former breeding sites) were identified at all but two localities currently supporting breeding colonies. The population on Shirley I., near Casey Station, increased between 1961/62 and 1968/69, but has remained stable since 1968/69, coincident with the opening of Casey Station. The lack of growth in the breeding population is likely to be a result of disturbance by visitors to the island. (Auth.)

B-46469
Woehler, E.J., **Morphology of prions Pachyptila and diving petrels Pelecanoides at Heard Island,** *Marine ornithology,* 1991 19(1), p.19-30, 17 refs.

Morphological data were collected from 40 antarctic prions *Pachyptila desolata* and 25 Fulmar prions *P. crassirostris,* 40 South Georgian diving petrels *Pelecanoides georgicus* and 25 common diving petrels *P. urinatrix* caught on Heard I. Antarctic prions at Heard I. were similar morphologically to those at Signy I., but there was considerable overlap between populations. Fulmar prions are believed to be sexually dimorphic, consistent with populations at other breeding localities. Common diving petrels may also be sexually dimorphic, but South Georgian diving petrels are not. The sole criterion that reliably separated the two species of diving petrel was the coloration of the tarsus. (Auth.)

B-46470
Kato, A., Williams, T.D., Barton, T.R., Rodwell, S., **Short-term variation in the winter diet of Gentoo Penguins Pygoscelis papua at South Georgia during July 1989,** *Marine ornithology,* 1991 19(1), p.31-38, 21 refs.

During winter 1989 at South Georgia, Gentoo penguins *Pygoscelis papua* showed a very rapid change in diet over a 10-day period. On July 11-12, food samples were of low masses (150 g) and had a high proportion of fish prey (75%) and heavily digested material (33%). On July 21-22, samples had higher masses (485 g), consisted predominantly of crustacean prey (99%) and had little heavily digested material (2%). Krill *Euphausia superba* was the most abundant crustacean species, forming 80% and 99% by number of individuals in the two sample periods. Data on winter diet are also compared over three years (1987-89). There was close similarity between years in the mass and composition of the two 'alternative' diets: low-mass, fish-dominated and high-mass, krill-dominated diets. However, there was no consistent pattern in the seasonal occurrence of these changes in diet between years. It is suggested that the change in diet reflects short-term, local decreases in availability of krill in the inshore waters exploited by Gentoo penguins. (Auth.)

B-46471
Oatley, T.B., **Antarctic and southern ocean bird banding review, July 1982-June 1987,** *Marine ornithology,* 1991 19(1), p.39-47, 13 refs.

A provisional total of 24,205 southern ocean birds of 54 species was banded by 10 nations between July 1986 and June 1987 at various antarctic, subantarctic and southern temperate localities. Penguins (38%) and procellariiforms (51%) were primary targets of banding effort. A review of updated banding totals for the five July-June years of 1982-1983 to 1986-1987 reveals that 91,514 birds of 60 species were banded, 65,839 (72%) of these belonging to only 20 species. (Auth.)

B-46472
Enticott, J.W., **Distribution of the Atlantic Petrel *Pterodroma incerta* at sea,** *Marine ornithology,* 1991 19(1), p.49-60, Refs. p.58-60.

The Atlantic or Schlegel's Petrel *Pterodroma incerta* is the only endemic gadfly petrel in the South Atlantic Ocean, breeding at the Tristan da Cunha group (including Gough I.). Data from published and unpublished sources have been collected to investigate at-sea distribution. There are more records to the west of Tristan da Cunha than to the east. Off South America, Atlantic Petrels are regularly recorded from 24 to 50S in large groups, in most months of the year. In the central South Atlantic birds are regularly recorded from 33 to 50S. In the southeast Atlantic birds occurred in small groups, from 12 to 48S, especially from July to Nov. Records in the Indian Ocean are few, usualy of singletons, and extend to 105E, usually from June to Dec. (Auth.)

B-46473
Cooper, J., **Publications and theses on antarctic and subantarctic birds, 1990,** *Marine ornithology,* 1991 19(1), p.61-68, 10 refs. from 1984-1989 are included.

A total of 134 scientific publications and theses on antarctic and subantarctic birds for the year 1990 is listed by title. This annual list is produced by the Bird Biology Subcommittee of the Scientific Committee on Antarctic Research (SCAR) Working Group on Biology as a service to marine ornithologists. (Auth.)

B-46474
Woehler, E.J., Graham, R., Hodges, C.L., **Multiple sightings of a Royal Albatross *Diomedea epomophora* in the southern Indian Ocean,** *Marine ornithology,* 1991 19(1), p.71-72, 6 refs.

Multiple sightings of a southern Royal Albatross from the general vicinity of Heard and Kerguelen Is. are reported. Twelve sightings were made between May 26 and June 24, 1990, from the R.S.V. *Aurora Australis* between 49.1-52.5S and 70.6-75.8E. All sightings were of a Stage 4 to Stage 5 bird and are conservatively assumed to be of the same individual.

B-46475
Bretagnolle, V., Weimerskirch, H., Jouventin, P., **Have giant petrels *Macronectes* spp. really increased at Iles Crozet,** *Marine ornithology,* 1991 19(1), p.73-74, 16 refs.

An argument is made against the proposition that a sharp increase in the breeding populations of the giant petrels *Macronectus halli* and *M. giganteus* occurred during 1966-1980 on Possession I. (Voisin, 1988). It is suggested that the giant petrel populations were stable, if not decreasing, in this time.

B-46476
Voisin, J.F., **Giant petrels *Macronectes* spp. increased at iles Crozet between 1966 and 1980,** *Marine ornithology,* 1991 19(1), p.75-77, 14 refs.

In reply to an argument (Bretagnolle *et al,* 1991) against the proposition that a sharp increase in the breeding populations of giant petrels *Macronectus* spp. occurred on Possession I. between 1966 and 1980 (Voisin, 1988), the author redefines his previous data-analysis methods, and reaffirms his previous position on the issue.

B-46477
Voskoboinikova, O.S., Balushkin, A.V., **On the taxonomic status of *Gobionotothen angustifrons sandwichensis* (Nototheniidae),** *Journal of ichthyology,* 1991(Pub. May 92) 31(9), p.71-78, Translated from Voprosy ikhtiologii. 13 refs.

A comparative study of external morphology of the *Gobionotothen angustifrons* (Fischer, 1885) from South Georgia and South Sandwich Is. has been performed. As a result, the validity of *G. angustifrons sandwichensis* (Nybelin, 1947) has been confirmed. (Auth.)

B-46478
Korovina, V.M., Neelov, A.V., Bondarenko, E.P., **Intestinal anatomy and histology of the marbled notothenia *Notothenia rossi marmorata*,** *Journal of ichthyology,* 1991(Pub. May 92) 31(9), p.79-90, Translated from Voprosy ikhtiologii. 21 refs.

Anatomy of digestive tract and anatomo-histological characteristics of the intestine of *Notothenia rossi marmorata* Fischer of South Georgia are described for the first time. Digestive tract exceeds body length of fish (SL) by 16%. The stomach is distinct, particularly its fundal part, forming a wide sac. Length of the intestine forms 72% of the length of the digestive tract and length of the midgut 59% of its length. Five to seven pyloric appendages are observed, their structure somewhat different from that of the midgut. Connective tissue and muscular tissue are well developed in the intestine, particularly in the hindgut. Located on the boundary of the midgut and hindgut is a short valva praerectalis, funnel-shaped with a single sphincter and similar to a coil of the spiral valve of the Teleostei. (Auth.)

B-46479
Shandikov, G.A., **Review of the antarctic rock cod genus *Nototheniops* (Nototheniidae) from the Indian sector of the southern ocean,** *Journal of ichthyology,* 1991(Pub. May 92) 31(9), p.91-115, Translated from Voprosy ikhtiologii. 20 refs.

The genus *Nototheniops* Balushkin, 1976, includes 4 species only one of which, *Nototheniops tchizh* (Balushkin), inhabits the Indian sector of the southern ocean. On the basis of a study of morphological features, including the characters of scaling, lateral-line system, and biology of *N. tchizh* from different points of its area, this species was subdivided into 3 subspecies: *N. tchizh tchizh* (Balushkin) (Lena and Ob seamounts), *N. tchizh minutus* subsp. n. (Prince Edward Is.) and *N. tchizh crozetensis* subsp. n. (Crozet Is.). A comparison of the subspecies of *N. tchizh* with other species of Nototheniops is made. (Auth.)

B-46480
Balushkin, A.V., **On the circumcontinental distribution of the plunderfish, *Pogonophryne macropogon* Eakin (Artedidraconidae), from Antarctica,** *Journal of ichthyology,* 1991(Pub. May 92) 31(9), p.116-119, Translated from Voprosy ikhtiologii. 5 refs.

A second specimen of *Pogonophryne macropogon* Eakin (fam. Artedidraconidae) is described and compared to its holotype. The finding of a second specimen off the South Shetland Is. points to the circumcontinental distribution of this species. (Auth.)

B-46519
Ferrari, F.D., **Be-net samples at the Smithsonian Oceanographic Sorting Center,** *Antarctic journal of the United States,* 1990 25(5), p.291, 4 refs.

Be-net plankton samples were collected from 1963 to 1967 on *Eltanin* cruises 9-19, 21-27, and 38 during a general survey of Atlantic and Pacific sectors of the southern ocean. At each station, plankton samples were taken from up to five depth increments: at 0-125 m, 125-250 m, 250-500 m with a multiple plankton sampler and at 500-1,000 m, 1,000-2,000 m with a bathypelagic plankton sampler. Both samplers had a square-mouth opening (70 cm on a side) with 202 mesh netting. Although specimens from these samples are over 20 years old, they continue to represent an excellent resource for studies of the stratification of plankton populations in the southern ocean. Motivation for the initial collecting was to provide for a general survey, but plankton samples from all months of the year are represented in the 5-year coverage so that seasonal changes in population parameters can be examined. In addition, with a judicious selection of study areas, enough different years can be represented so that investigations of interannual changes of some population parameters can be initiated.

B-46526
Di Prisco, G., ed, Maresca, B., ed, Tota, B., ed, **Biology of antarctic fish,** Berlin, Springer-Verlag, 1991, 292p., Refs. passim. For individual papers see B-46527 through B-46544.

DLC QL637.2.B56

This book presents the most recent findings on the biology of fish in the unique environment of the antarctic oceans. At present, the year-round temperature of the coastal waters is very near -1.87 C, the equilibrium temperature of the ice-seawater mixture. This extremely low temperature affects different levels of organization of fish life: individuals, organ systems, cells, organelles, membranes, and molecules. Exploring ecology, evolution, and life history as well as physiology, biochemistry, and molecular biology of antarctic fish, the book describes the mechanisms of cold adaptation at all these levels. It provides material for discussion also for fundamental questions in the field of adaptation to an extreme environment.

B-46527
Hubold, G., **Ecology of notothenioid fish in the Weddell Sea,** Biology of antarctic fish, edited by G. Di Prisco, B. Maresca and B. Tota, Berlin, Springer-Verlag, 1991, p.3-22, Refs. p.18-22.

DLC QL637.2.B56

A review is presented of the Weddell Sea environment—including abiotic factors, plankton biomass and production, and benthos—and of the Weddell Sea fish fauna, including fish biomass, species composition and diversity, feeding and activity, metabolism, size and growth, reproduction, early life history and energy budget.

B-46528
Ekau, W., **Morphological adaptation and mode of life in high antarctic fish,** Biology of antarctic fish, edited by G. Di Prisco, B. Maresca and B. Tota, Berlin, Springer-Verlag, 1991, p.23-39, Refs. p.37-39.

DLC QL637.2.B56

As a result of their capability to adapt to adverse conditions, monophyletic notothenioids contribute more than 90%, in numbers and biomass, of the demersal fish fauna in the southern ocean. They comprise a group of fish with a large variety of morphological forms. In this work an attempt was made to classify the *Trematomus* and *Pagothenia* species from the Weddell Sea according to ecological aspects, and to rank them in order of demersal to pelagic life-styles, using different statistical methods.

B-46529
Duhamel, G., **Biological and demographic peculiarities of the icefish *Champsocephalus gunnari* Lönnberg, 1905 from the Kerguelen Plateau,** Biology of antarctic fish, edited by G. Di Prisco, B. Maresca and B. Tota, Berlin, Springer-Verlag, 1991, p.40-53, Refs. p.52-53.

DLC QL637.2.B56

A biological and demographic study of icefish in the Indian sector of the southern ocean is discussed. The length frequency distributions (LFD) data obtained for the Kerguelen area show for the first time that two groups, corresponding probably to two separate populations, are observed in the same geographical area with distinct spawning periods and depth range of egg-laying. The LFD are available for two periods, 1974-75 and 1977-78, and are summarized.

B-46530
Clarke, A., North, A.W., **Is the growth of polar fish limited by temperature,** Biology of antarctic fish, edited by G. Di Prisco, B. Maresca and B. Tota, Berlin, Springer-Verlag, 1991, p.54-69, Refs. p.67-69.

DLC QL637.2.B56

An analysis is presented of three hypotheses regarding the slow growth of polar fish, i.e. a direct limitation by temperature; adaptation to cold water, which necessitates an elevation of metabolic rate with a concomitant reduction in the energy available for growth; and seasonal resource limitation. Studies of annual growth rates and seasonality of growth of adult antarctic fish, and growth rates of larval fish, are reviewed. Although the results of the analysis imply that temperature acts as a constraint on the growth rate of larval fish, this is not regarded as a firm conclusion. Carefully controlled laboratory experiments on representative species from polar, temperate and tropical seas are recommended on the assumption that field data will always be equivocal.

B-46531
North, A.W., **Review of the early life history of antarctic notothenioid fish,** Biology of antarctic fish, edited by G. Di Prisco, B. Maresca and B. Tota, Berlin, Springer-Verlag, 1991, p.70-86, Refs. p.82-86.

DLC QL637.2.B56

This review focuses on development, morphology, pigmentation, community structure, diet and growth of the antarctic Notothenioidei. In addition, their early development is briefly compared with fish from warmer regions, the author pointing out that the period of development from the larval to the juvenile stage in the former is usually 6-12 months, whereas periods of weeks or days are common for temperate and tropical marine fish, respectively.

B-46532
White, M.G., **Age determination in antarctic fish,** Biology of antarctic fish, edited by G. Di Prisco, B. Maresca and B. Tota, Berlin, Springer-Verlag, 1991, p.87-100, Refs. p.96-100.

DLC QL637.2.B56

Because the polar marine environment is markedly seasonal, it is anticipated that growth increments will be readily determined in the traditional structures such as otoliths, scales and bones. Age derived from the examination of seasonal increments has been examined in more than 20 antarctic species of fish, mostly species that have been subjected to the commercial-scale fishery in the southern ocean. A table indicates these species, the material investigated and the source publications.

B-46533

Radtke, R.L., Kellermann, A., **Microstructural analysis of growth patterns in the early life history of antarctic fishes,** Biology of antarctic fish, edited by G. Di Prisco, B. Maresca and B. Tota, Berlin, Springer-Verlag, 1991, p.101-115, Refs. p.112-115.

DLC QL637.2.B56

The emergence of structural techniques of otolith analysis in antarctic larval fish makes it possible to examine the age and provide information about the developmental processes and ecology of the larvae. The data presented interpret the increments found in the microstructure of the otoliths as daily occurrences, and make it possible to obtain accurate age estimates. It is the authors' perception that daily increments can be used accurately for age and growth determination.

B-46534

Eastman, J.T., **Fossil and modern fish faunas of Antarctica: evolution and diversity,** Biology of antarctic fish, edited by G. Di Prisco, B. Maresca and B. Tota, Berlin, Springer-Verlag, 1991, p.116-130, Refs. p.127-130.

DLC QL637.2.B56

Like the continent itself, the fish faunas of Antarctica have changed remarkably through geologic time. Current information indicates that the various fossil faunas are: different in taxonomic composition and paleoecology; separated by large gaps in geologic time; and not ancestral to each other. Paleozoic fish are represented by most higher taxonomic groups in existence at that time. Mesozoic fish are not known from extensive faunal associations, but rather as single taxa from sites separated by distance and geologic time. A reasonably diverse chondrichthyan fauna inhabited temperate waters near the Antarctic Peninsula during the Late Cretaceous and Late Eocene, but there are only some 7 species in the modern fauna. Continuing work on Seymour I. fossils is expanding the known diversity of the late Eocene teleostean fauna. However, the known Seymour I. fauna does not share any taxa with the modern fauna. Unlike the situation in the shelf waters of the other continents, the modern antarctic fauna is dominated by a single endemic group: the notothenioids. Notothenioids probably first appeared in the early Tertiary and began to diversify in the middle Tertiary while the climate was cooling. Unfortunately, there are no paleontologic and insufficient systematic data to allow more precise refinement of the time frame for the evolution of this group.

B-46535

El-Sayed, S.Z., **Contribution of the BIOMASS program to antarctic marine ecosystem research,** Biology of antarctic fish, edited by G. Di Prisco, B. Maresca and B. Tota, Berlin, Springer-Verlag, 1991, p.131-142, 6 refs.

DLC QL637.2.B56

The history of the BIOMASS program is briefly reviewed and its accomplishments are examined. Its impact on the study of the ecosystem of the southern ocean and on the conservation of the marine living resources of Antarctica in general, and future biological research in the southern ocean in particular, are discussed. Because of the pivotal role of krill in the antarctic food web, and because of its potentially significant contribution to world protein supplies, krill studies have played a key role in the BIOMASS program.

B-46536

Macdonald, J.A., Montgomery, J.C., **Sensory biology of notothenioid fish,** Biology of antarctic fish, edited by G. Di Prisco, B. Maresca and B. Tota, Berlin, Springer-Verlag, 1991, p.145-162, Refs. p.160-162.

DLC QL637.2.B56

The available literature on the sensory biology of antarctic fish is reviewed, placing particular emphasis on what appear to be specialized aspects of their sensory repertoire. Also examined is the extent to which antarctic fish are able to maintain sensory function at "normal levels" despite the extreme cold. Some of the areas where there are obvious gaps in our knowledge, or where particularly productive lines of research are evident, are highlighted.

B-46537

Macdonald, J.A., Wells, R.M.G., **Viscosity of body fluids from antarctic notothenioid fish,** Biology of antarctic fish, edited by G. Di Prisco, B. Maresca and B. Tota, Berlin, Springer-Verlag, 1991, p.163-178, Refs. p.176-178.

DLC QL637.2.B56

The notothenioids are generally believed to have originated and diversified in frigid antarctic seas, resulting in a variety of biochemical and physiological specializations. An all-pervading consequence of low temperature is an increase in fluid viscosity; accordingly, a review of the relevance of viscosity to the physiology of antarctic fish is presented.

B-46538

Johnston, I.A., Johnson, T.P., Battram, J.C., **Low temperature limits burst swimming performance in antarctic fish,** Biology of antarctic fish, edited by G. Di Prisco, B. Maresca and B. Tota, Berlin, Springer-Verlag, 1991, p.179-190, Refs. p.189-190.

DLC QL637.2.B56

Antarctic fish have become highly specialized for cold conditions, and their upper lethal temperatures are often only 5-6 C. Shallow-water species synthesize a variety of glycopeptide or peptide antifreezes to prevent the growth of ice crystals in the blood down to -2.7 C. During burst swimming, ATP utilization by the fast muscle fibers increases over 100-fold very rapidly. Since maximum speed is an important factor determining the success of prey capture and predator avoidance, it is crucial to the survival of individuals, and presumably subject to high selective pressures. Larval stages are capable of much higher tail-beat frequencies and length-specific speeds than adult fish because of scaling effects. Hence the escape behavior of larvae is an ideal place to look for the limits to cold adaptation in polar species.

B-46539

Hemmingsen, E.A., **Respiratory and cardiovascular adaptations in hemoglobin-free fish: resolved and unresolved problems,** Biology of antarctic fish, edited by G. Di Prisco, B. Maresca and B. Tota, Berlin, Springer-Verlag, 1991, p.191-203, Refs. p.200-203.

DLC QL637.2.B56

Due to the low solubility which oxygen has in aqueous solutions, the presence of an oxygen-carrying pigment in the blood has been regarded as a necessity in all but the simplest types of animals. Yet all species of the antarctic and subantarctic fish family *Channichthyidae* lack such a pigment. The family is comprised of 16 known species among 10 genera, with adult sizes ranging from about 20 to about 60 cm. The distribution is circumpolar, with some species extending north to such areas as Patagonia, the Falkland Is., South Georgia, and Bouvet and Kerguelen Islands. An overview is presented of the results obtained in various physiological studies on the channichthyids, specifically with regard to adaptations which appear to have occurred in response to the absence of hemoglobin. Certain functions are compared with those in other cold-water teleosts which have hemoglobin.

B-46540

Tota, B., **Structural and mechanical characteristics of the heart of the icefish *Chionodraco hamatus* (Lönnberg),** Biology of antarctic fish, edited by G. Di Prisco, B. Maresca and B. Tota, Berlin, Springer-Verlag, 1991, p.204-219, Refs. p.218-219.

DLC QL637.2.B56

It is the purpose of this paper to focus on the characteristics of the mechanical performance of the heart of the icefish *Chionodraco hamatus,* revealed by an isolated and perfused working heart preparation, and to report data on the structural arrangement of the heart in this species and in *Chaenocephalus aceratus,* previously studied in the laboratory. Attention is drawn to the icefish heart as a muscular pump; a comparison is made with what is known in other teleosts. The specimens of *Chionodraco hamatus,* the most common icefish in Terra Nova Bay, were collected during the 5th Italian Antarctic Expedition (Dec. 1989-Feb. 1990).

B-46541

Sidell, B.D., **Physiological roles of high lipid content in tissues of antarctic fish species,** Biology of antarctic fish, edited by G. Di Prisco, B. Maresca and B. Tota, Berlin, Springer-Verlag, 1991, p.220-231, Refs. p.230-231.

DLC QL637.2.B56

This article begins by briefly reviewing current information on the question of metabolic cold adaptation of antarctic fish. The discussion is then directed primarily toward physiological significance of the very high lipid content of these animals. Arguments are presented based upon recent laboratory data suggesting that the aerobic energy metabolism of antarctic fish is predominantly reliant upon the oxidation of fatty substrates; and that the high fat content of tissues may also affect movement of respiratory gases between capillaries and mitochondria.

B-46542

Somero, G.N., **Biochemical mechanisms of cold adaptation and stenothermality in antarctic fish,** Biology of antarctic fish, edited by G. Di Prisco, B. Maresca and B. Tota, Berlin, Springer-Verlag, 1991, p.232-247, Refs. p.246-247.

DLC QL637.2.B56

This paper focuses primarily on two aspects of biochemical adaptation to the extremely low (and highly stable) temperatures encountered by antarctic fish. The adaptive modifications of enzymatic and structural proteins which underlie high rates of controlled catalytic function and physiologically appropriate subunit assembly processes at subzero temperatures are considered first. Profound evolutionary changes have occurred in diverse enzymatic and structural proteins of antarctic fish, which allow the organisms to sustain the same types of closely regulated metabolic and locomotory activities found in other organisms, and often to express these activities at rates similar to those found in fish with substantially higher cell temperatures. The second issue addressed stems from the observation that antarctic fish die of heat death at remarkably low temperatures. The upper lethal temperatures of three -1.9 C-adapted notothenioid species from McMurdo Sound, *Pagothenia borchgrevinki, Trematomus bernacchii,* and *Trematomus hansoni,* were only approximately 6 C. This is the lowest temperature of heat death known for any animal. Thus, cold adaptation in antarctic fish is paired with an extreme degree of stenothermality.

B-46543

Detrich, H.W., III, **Polymerization of microtubule proteins from antarctic fish,** Biology of antarctic fish, edited by G. Di Prisco, B. Maresca and B. Tota, Berlin, Springer-Verlag, 1991, p.248-262, Refs. p.260-262.

DLC QL637.2.B56

The molecular features that enable the microtubule proteins of poikilotherms to polymerize efficiently at low temperatures were determined, using the coastal fish of the Antarctic Peninsula as the model system. Near Palmer Station these cold-adapted osteichthyans, which diverged from temperate fish approximately 40 million years ago as the southern ocean cooled, live at an annual mean bottom temperature of -1.0 C (seasonal range -0.1 C in Jan. to -1.9 C in Aug). Thus antarctic fish are well suited to studies of macromolecular adaptation to low temperatures.

B-46544

Di Prisco, G., **Biochemistry of oxygen transport in red-blooded antarctic fish,** Biology of antarctic fish, edited by G. Di Prisco, B. Maresca and B. Tota, Berlin, Springer-Verlag, 1991, p.263-281, Refs. p.279-281.

DLC QL637.2.B56

The search for correlation between fish hematology and the exceptionally extreme conditions of the antarctic environment raises a number of intriguing questions, and justifies a study on the biochemistry of oxygen transport, with special attention on the relationship between the molecular structure and the oxygen-binding properties of hemoglobin. The long-range aim of this study is to gain some insight into the molecular basis of cold adaptation, as well as into the history of fish evolution during the isolation that followed the separation and drift of Antarctica from Gondwana.

B-46571

Robisson, P., **Broadcast distance of the mutual display call in the Emperor Penguin,** *Behaviour,* Dec. 1991 119(3-4), p.302-316, Refs. p.314-316.

In the colonial emperor penguin *Aptenodytes forsteri,* the broadcast distance of the mutual display call (the distance over which the individual information conveyed by the call is transmitted) was determined. The variables measured were: the sound amplitude, which averaged 94.8 dB SPL for birds facing toward the microphone and 85.7 dB SPL for birds facing away; the sound attenuation, which decreased with about 6 dB per doubling distance; the ratio of the signal to the background noise of the colony which was 20-25 dB during the rearing period of chicks; and the degradation of the signal structure by the scattering medium (penguin bodies) and distance, which affected the timbre, but not the two fundamental frequencies of the call that produced a beat phenomenon. This distance, 4-7 m, indicates that the call is transmitted at short- or medium-range, and corresponds closely to the distance covered between two stops where a parent in search for its chick calls. (Auth. mod.)

B-46573

Bloomer, J.P., Bester, M.N., **Control of feral cats on subantarctic Marion Island, Indian Ocean,** *Biological conservation,* 1992 60(3), p.211-219, Refs. p.218-219.

Since their introduction in 1949, feral cats have caused extensive damage to seabird populations on Marion I. This paper reports on the first 4 years of an eradication program launched in 1986. Eight hundred and seventy-two cats were shot dead and 80 trapped during 14,725 hours of hunting. Cats sighted per hour of night hunting and kills per hour decreased dramatically. Hunting success (cats killed as a proportion of those seen) decreased. The only reliable indication of the decrease in density as a result of hunting was the decrease in the number of cats seen per hour of night hunting. By the end of the third season it was apparent that hunting alone was no longer removing sufficient animals to maintain the population decline, and trapping was incorporated into the eradication program. (Auth.)

B-46574

Jacob, A., Lehmann, H., Kirst, G.O., Wiencke, C., **Changes in the ultrastructure of *Prasiola crispa* ssp. *antarctica* under salinity stress,** *Botanica acta,* Feb. 1992 105(1), p.41-46, Refs. p.45-46.

The supralittoral green alga *Prasiola crispa,* collected in Antarctica, was grown at salinities ranging from 0.35 per mill to 175 per mill. Its ultrastructure was examined by electron microscopy and compared with the ultrastructure of plants grown under standard conditions (35 per mill). The thalli had very thick cell walls, making up approximately 50% of the thallus volume. Most of the protoplast was occupied by a single chloroplast. Numerous starch granules in the chloroplast were enlarged under hypo-osmotic conditions and reduced in volume when subjected to hyperosmotic stress, indicating a metabolic shift towards low molecular weight organic osmolytes under the latter conditions. Whilst vacuoles were lacking in plants cultured at salinities between 0.35 per mill and 35 per mill, they developed under hyperosmotic conditions and possibly may serve as compartments accumulating inorganic ions. Growth, photosynthesis and dark respiration were strongly inhibited under higher salinities, whilst they remained almost unaffected under lower salinities. (Auth.)

B-46580
Meyer-Rochow, V.B., **Observations on an accidental case of raw sewage pollution in Antarctica,** *Zentralblatt für Hygiene und Umweltmedizin,* Mar. 1992 192(6), p.554-558, 6 refs.

The effects of an accidental exposure to saltwater polluted by human wastes on aquarium populations of a variety of antarctic organisms are described. Only the giant antarctic slater *Glyptonotus antarcticus* survived the exposure to the contaminated water unharmed. A comparative analysis of water qualities revealed that total nitrogen and phosphorus levels of the contaminated sample were 15 and 19.5 times higher than those of the control and that the contaminated sample contained high amounts of coliform bacteria, whereas the latter were not identified in the control. Considering the widespread practice in Antarctica of disposing of raw sewage into the sea, the dearth of knowledge concerning the biological impact of such behavior is seen as worrisome. (Auth.)

B-46592
Tanimura, A., Fukuchi, M., Ohtsuka, H., Hoshiai, T., **Zooplankton data collected with BIOMASS Programme at Syowa Station in 1982 by JARE-23. 2. "NIPR"-1" samples: Stn. 5,** *Japanese Antarctic Research Expedition. JARE data reports,* Mar. 1992 No.177, 183p., 4 refs.

This report summarizes the data on zooplankton collected with the "NIPR-1" sampler at Stn. 5 during the JARE-23 overwintering program in 1982. A total of 180 samples were obtained with modified "NIPR-1" sampler from 10 layers between 0 and 150 m depth during Apr. through Dec. 1982. The sampling system of the modified sampler is shown. The results of the primary sorting are presented. Zooplankton were sorted into 29 categories, which are shown in tables. Copepoda were comprised of Calanoida, Cyclopoida and Harpacticoida. Euphausiacea were counted separately for the nauplius stages and the other stages. Eggs include those of crustacean and benthic invertebrates, etc. Planktonic larval forms include benthic invertebrate larvae other than Polychaeta.

B-46605
Dartnall, H.J.G., **Reproductive strategies of two antarctic rotifers,** *Journal of zoology,* May 1992 227(Part 1), p.145-162, 16 refs.

The bdelloid rotifers *Philodina gregaria* Murray and *Adineta grandis* Murray were both cultured through three generations. The results suggested the following models for calculation purposes: (1) that individual *A. grandis* live for 40 days and at death give rise to five offspring; (2) that individual *P. gregaria* live for 89 days, producing 18 young at three-day intervals, the first on day 36 and the last on day 87 (the animal dying two days later). Mathematical expressions for population growth were formulated from these models, and used to interpret the field observations obtained from a shallow pool on Signy I. during the course of an antarctic summer. Midway through the summer, two seals crawled through the pool and upset the continuity of the field study. This natural catastrophe not only provided an interesting insight into the recovery of such habitats but provided an opportunity to test further the hypotheses formulated in the culture experiments. (Auth.)

B-46607
Skoufias, D.A., Wilson, L., Detrich, H.W., III, **Colchicine-binding sites of brain tubulins from an antarctic fish and from a mammal are functionally similar, but not identical: implications for microtubule assembly at low temperature,** *Cell motility and the cytoskeleton,* 1992 21(4), p.272-280, 65 refs.

The tubulins of antarctic fishes possess adaptations that favor microtubule formation at low body temperatures. At temperatures between 0 and 20 C, the affinity constants for colchicine binding to the fish tubulin were slightly smaller than those for bovine tubulin. A van't Hoff analysis showed that the standard enthalpy changes for colchicine binding to the two tubulins were comparable as were the standard entropy changes. At saturating concentrations of the ligand, the maximal binding stoichiometry for each tubulin was about 1 mol colchicine/mol tubulin dimer. The data indicate that the colchicine-binding sites of the two tubulins are similar, though probably not identical, in structure. The apparent absence of major structural modifications at the colchicine site suggests that this region of tubulin is not involved in functional adaptation for low-temperature polymerization. Rather, the colchicine site of tubulin may have been conserved evolutionarily to serve *in vivo* as a receptor for endogenous molecules that regulate microtubule assembly. (Auth. mod.)

B-46608
Ray, M.K., Uma Devi, K., Seshu Kumar, G., Shivaji, S., **Extracellular protease from the antarctic yeast *Candida humicola*,** *Applied and environmental microbiology,* June 1992 58(6), p.1918-1923, 28 refs.

The psychrotrophic dimorphic yeast *Candida humicola,* isolated from antarctic soil, secretes an acidic protease into the medium. The secretion of this protease by *C. humicola* was dependent on the composition of the medium. In a YPD or yeast nitrogen base medium containing either amino acids or ammonium sulfate as the nitrogen source, the activity of the protease in the medium was low (basal level). However, when the yeast nitrogen base medium was depleted of amino acids or ammonium sulfate and supplemented with proteins, the activity of the enzyme increased. The secretion of the enzyme was greater during exponential growth at low temperatures than during growth at higher temperatures. The purified protease had a molecular mass of 36,000 Da and was inhibited by pepstatin, iodoacetamide, and sodium dodecyl sulfate. Despite the prevalent cold temperatures in Antarctica, this extracellular protease of the psychrotrophic yeast *C. humicola* was active at temperatures ranging from 0 to 45 C, with an optimum activity at 37 C. (Auth.)

B-46609
Di Prisco, G., Macdonald, J.A., Brunori, M., **Antarctic fishes survive exposure to carbon monoxide,** *Experientia,* May 15, 1992 48(5), p.473-475, 23 refs.

The extensive in vivo conversion of haemoglobin to the carbon monoxide derivative has no discernible effect on the survival of the red-blooded antarctic fish *Pagothenia bernacchii.* Analysis of caudally sampled blood of cannulated specimens revealed that reconversion of carbon-monoxy haemoglobin to oxyhaemoglobin was complete within 48 hours. Thus, under stress-free conditions, haemoglobin is not necessary for survival of *P. bernacchii.* Red-blooded antarctic fishes can carry oxygen necessary for routine delivery dissolved in plasma, in a similar way to the haemoglobinless Channichthyidae, although they lack the morphological and physiological adaptations which allow the latter to prosper without any haemoglobin. (Auth.)

B-46635
Gowing, M.M., Garrison, D.L., **Abundance and feeding ecology of larger protozooplankton in the ice edge zone of the Weddell and Scotia Seas during the austral winter,** *Deep-sea research,* May 1992 39(5A), p.893-919, Refs. p.916-919.

Biomasses, abundances and feeding ecology of larger (>50 micron diameter) protozooplankton were studied in the upper 210 m in the ice edge zone of the Weddell/Scotia Sea area in the austral winter of 1988. Sixty-liter water samples were taken at five depths at 17 stations, and organisms were concentrated by reverse-flow filtration. Mean abundances and biomass of the total assemblage of larger protozooplankton were measured in the upper 210 m. The abundances and biomasses are lower than for other seasons in the Antarctic, are comparable to abundances reported for several of these groups in lower latitude waters, and are attributed to slower growth and reduced food, rather than to increased mortality. The large protozooplankton fed on both autotrophic and heterotrophic organisms in winter, although the biomass of smaller forms is dominated by heterotrophs. Feeding on detrital particles also was indicated by the presence of siliceous fragments in vacuoles. The larger protozooplankton in the winter ice edge zone may be important in reducing particle flux to the deep sea and as a food source for larger zooplankton, especially from the base of the euphotic zone to 210 m. (Auth. mod.)

B-46637
Hindell, M.A., Slip, D.J., Burton, H.R., **Diving behaviour of adult male and female southern elephant seals, *Mirounga leonina* (Pinnipedia:Phocidae),** *Australian journal of zoology,* 1991 39(5), p.595-619, 43 refs.

In this study on elephant seals, over 50,000 individual dive records collected by time-depth recorders were analyzed with respect to sex of the seal, time of year and the approximate geographic location of the dive. Six distinct dive types were described on the basis of parameters such as the amount of time spent at the maximum depth of the dive, the rate of ascent and descent, and the general form of the dive profile. These dive types were 'rest' dives, 'travel' dives, 'surface' dives, 'general non-foraging' dives, 'pelagic foraging' dives and 'benthic foraging' dives. The seals spent 90% of their time at sea submerged. Less than 2% of the time was spent on the surface in intervals of more than 10 min. A further 20-30% of the time was spent on the various non-foraging types of dives. Most females performed only 'pelagic foraging' dives, while males performed both 'pelagic' and 'benthic foraging' dives. All the 'benthic foraging' dives occurred in Area 3 (defined by water-temperature data as lying over the Antarctic Continental Shelf) and were 400-500 m deep. 'Pelagic foraging' dives occurred in all three foraging areas and ranged in depth from 200 to 1100 m. These types of dives also exhibited marked diurnal variations in depth, unlike 'benthic foraging' dives. The seals spent 10-20 min at the bottom of each 'foraging' dive, where they generally displayed a series of small changes in depth ('wiggles'). (Auth. mod.)

B-46638
McDonald, M.A., **Biochemical systematics of Notothenioid fishes from Antarctica,** *Biochemical systematics and ecology,* Apr. 1992 20(3), p.233-241, 31 refs.

Genetic variation at 30 protein-coding loci was examined in seven forms of notothenioid fishes from Antarctica. Multilocus heterozygosity varied from 0.018 to 0.078 across taxa. An analysis of the allozyme data revealed the probable existence of an unrecognized cryptic species within *Trematomus bernacchii.* *Pagothenia borchgrevinki* is as closely related to some species of *Trematomus* as are some species of *Trematomus* to each other. Speciation among the species of *Trematomus* and *Pagothenia* appears to have taken place primarily after the separation of Antarctica from Australia. (Auth.)

B-46639
Ozouf-Costaz, C., Hureau, J.C., Beaunier, M., **Chromosome studies on fish of the suborder Notothenioidei collected in the Weddell Sea during EPOS 3 cruise,** *Cybium,* Dec. 1991 15(4), p.271-289, With French summary. 27 refs.

Twenty-six species belonging to the suborder Notothenioidei have been karyotyped. The results are listed together with all other karyotypic data now available for the suborder. Intraspecific variation of karyotypic numbers and formulae is not significant and confirms that within a species, the karyotype is highly stable. In Nototheniidae and Bathydraconidae, chromosome numbers show a strong interspecific variability involving inversions, Robertsonian translocations and probably duplications. In Channichthyidae, the chromosome number is conserved and the differences in chromosome structure are correlated with peri- or paracentric inversions and also duplications. In Artedidraconidae, the karyotype appears more generic than specific with minor restructuring. Morphologically differentiated sex chromosomes have been recorded in 5 species of Channichthyidae (X1X1X2X2/X1X2Y) and also appears in one Bathydraconida (XX/XY1Y2). (Auth.)

B-46645
Siegel, V., **Assessment of the krill *Euphausia superba* spawning stock off the Antarctic Peninsula,** *Archiv für Fischereiwissenschaft,* June 1992 41(2), p.101-130, With German summary. 79 refs.

A net sampling survey for krill was carried out by RV *Meteor* along the Antarctic Peninsula from Dec. 26, 1989 to Jan. 14, 1990. Results were compared with data from a survey conducted by RV *Polarstern* in 1987/88. Main concentrations were observed near Elephant I., King George I., in the central Bransfield Strait and on the southwestern shelf of the Peninsula. Four distinct site clusters of krill size classes and maturity stages were found, confirming the spatial succession of maturity stages from nearshore to oceanic waters. Almost no gravid females occurred in Bransfield Strait waters. First occurrence of spent females indicated the onset of the breeding season in early Jan. Juvenile krill of age group 1+ (year-class 1988/89) was almost missing in the stock. Total amount of krill was higher in 1987/88 than in 1989/90. Total instantaneous biomass was calculated as 1.16 million tonnes (1989/90) and 1.65 million tonnes (1987/88), respectively. More than 96% of the krill biomass occurred in the upper 0-60 m depth stratum. Seasonal variation between summer and winter abundance/biomass data exceeded a factor of 35 times, while interannual variability between available summer surveys reached only a factor of 1.6 times. (Auth. mod.)

B-46647
Marquardt, F.H., Carreño, R.R., **Production of colorless chitin from antarctic krill *(Euphausia superba)* shell waste,** *Archiv für Fischereiwissenschaft,* June 1992 41(2), p.159-163, With German summary. 13 refs.

Normally, the pigments from the eyes of krill cause an intense, in acetone non-extractable, pink coloration. In the course of a demineralization (prior to a deproteinization), the eyes lose their solid structure and change into a sticky mass, which retains their pigmentation. This mass attaches itself to the walls and baffles of the reactor, and in this way can be separated with ease from the suspension of solid shell residues. Treatment of these residues with acetone, followed by deproteinization, yields colorless chitin. This technique for the removal of the pigmented eye-mass could be used to develop a process for the production of colorless chitin in industrial scales. The chitincoloring eye pigments of krill were found to be of two types, which differ in their solubility in acetone. Aside from the well-known red acetone-soluble astaxanthines, a brown acetone-insoluble pigmentation was also observed, which was assumed to be the krill ommochrome and/or xanthomatin. If the chitin is colored by a mixture of both types of pigments, the astaxanthines apparently lose their solubility in acetone. (Auth.)

B-46671
Williams, T.D., **Diving pattern and performance in nonbreeding Gentoo Penguins *Pygoscelis Papua* during winter,** *Auk,* Apr. 1992 109(2), p.223-234, 37 refs.

Foraging ranges and prey capture rates are estimated for Gentoo penguins, and foraging behavior was compared with that of breeding birds. Foraging was highly diurnal with 98% of foraging trips completed during the same day. Foraging-trip frequency was 0.8/day, trip duration was 6-8 h, and birds spent 51-62% of the foraging trip diving. Dive depth and duration were bimodal. Shallow dives averaged 5-8 m and 0.5-1.3 min. Deep dives averaged 74-105 m and 2.7-3.5 min, respectively. Deep-dive duration exceeded the subsequent surface interval, but shallow dives were followed by surface intervals two to three times dive duration. Deep dives showed clear diel patterns, averaging 10-20 m at dawn and dusk and 70-90 m at midday. These results are consistent with the patchy vertical and horizontal distribution and diel movements of antarctic krill, the main winter prey of Gentoo penguins (including study birds). It appears that shallow dives are mainly searching dives, and deep dives mainly for feeding. Foraging activity of nonbreeding Gentoo penguins in winter is similar to that of chick-rearing birds. The only major differences are that foraging-trip frequency is 20% less and stomach-content mass on return ashore 30% less in winter. The authors conclude that foraging activity in Gentoo penguins is changed by varying the frequency and duration of foraging trips, rather than by changing the pattern and rate of diving. (Auth. mod.)

B-46694
Arcos, F., **Biometric observations on a krill sample** [Observaciones biométricas de una muestra de krill antártico *(Euphausia superba)*], *Acta antártica ecuatoriana,* 1990 Vol.1, p.29-31, In Spanish with English summary. 6 refs.

Based on a surface sample of 226 individuals of krill *Euphausia superba,* several biometric determinations were performed. Length and weight were measured to determine characteristics of a portion of the population to correlate by means of statistics some variables of males and females, separately. (Auth.)

B-46695
Cruz, M., **Marine benthos in Discovery Bay** [Estudio del bentos marino antártico en Bahía Chile o Discovery, Isla Greenwich (Islas Shetland del Sur), Antártida], *Acta antártica ecuatoriana,* 1990 Vol.1, p.33-45, In Spanish with English summary. 17 refs.

From the analysis of 14 sediment samples, 4 species of mollusca Pelecypoda, 2 Gastropoda and, as additional fauna, 12 groups of benthic organisms belonging to 8 filums, are identified. A brief taxonomic description is presented, and the principal characteristics of each species, correlated with the type of sediment and depth, are pointed out. Tables and areal distribution maps of groups and species of mollusca found, as well as illustrations of the malacofauna captured in Discovery Bay during the austral summer of 1991, are presented.

B-46696
Valverde, F.M., Arcos, F., **Vegetation cover of Canto Point, Greenwich I.** [Estudios preliminares de la cobertura vegetal en Punta Fort Williams—Isla Greenwich], *Acta antártica ecuatoriana,* 1990 Vol.1, p.47-55, In Spanish with English summary. 9 refs.

As part of an ecological survey, a qualitative and quantitative study of plant distribution was carried out at Canto Point, where the Pedro Vicente Maldonado Station is located. Five species of mosses, belonging to 4 families, and 19 species of lichens, belonging to 11 families, are described and illustrated. These species appear to be the most common and representative of the studied region. (Auth. mod.)

B-46697
Arcos, F., **Fresh water pond at Canto Point, Greenwich I.** [Estudios preliminares en un cuerpo de agua dulce de Punta Fort Williams, Isla Greenwich], *Acta antártica ecuatoriana,* 1990 Vol.1, p.57-67, In Spanish with English summary. 17 refs.

As part of environmental impact assessment studies during the Third Ecuadorian Antarctic Expedition, in Jan.-Feb. 1991, a physical, chemical and biological survey was initiated in a fresh-water body located at Canto Point, Greenwich I. The pond formed at a depression of the land and is exposed to high winds. It is shallow and well oxygenated, with nutrient availability due to the input of plant material carried by wind. The pond is oligotrophic, with no animal excreta input. The plankton analysis shows phytoplankton dominated by *Achnanthes* in concentrations up to 1,800,000 cel/l. Zooplankton is mainly represented by Copepoda and Anostraca, phytoplankton and detritus feeders. Variation in the ontogenic composition has been observed in the copepods during the study period. (Auth. mod.)

B-46704
Harrison, W.G., Cota, G.F., **Primary production in polar waters: relation to nutrient availability,** *Polar research,* Dec. 1991 10(1), Pro Mare Symposium on Polar Marine Ecology, Trondheim, Norway, May 1990. Proceedings, edited by E. Sakshaug, C.C.E. Hopkins, and N.A. Oritsland, p.87-104, Refs. p.100-104.

Temperature, light and dissolved nutrients are considered the "master" abiotic properties controlling primary production in the ocean. Each of these properties in turn is influenced by water column stability and vertical mixing. For both polar regions, extremes in each of these properties is the rule in surface waters where phytoplankton grow: the lowest ocean temperatures, the greatest seasonal excursion in incident solar radiation, and the highest dissolved nutrient concentrations. Current perspectives are that important differences exist between the Arctic and Antarctic with regard to the availability and the role nutrients play in regulating primary production. In general, much less emphasis is now placed on the significance of the macronutrients in the Antarctic, although there is speculation and some evidence that "micronutrients" (Fe) may be important. Macronutrient availability appears to play a more important, though secondary, role in the Arctic, that of sustaining rather than initiating phytoplankton growth. This paper reviews early, contemporary, and present research addressing the question, "What role does nutrient availability play in the distribution and magnitude of primary production in Arctic and Antarctic waters?" Emphasis is placed on new research on under-ice communities as well as on the historically studied pelagic communities. (Auth. mod.)

B-46705

Azam, F., Smith, D.C., Hollibaugh, J.T., **Role of the microbial loop in antarctic pelagic ecosystems,** *Polar research,* Dec. 1991 10(1), Pro Mare Symposium on Polar Marine Ecology, Trondheim, Norway, May 1990. Proceedings, edited by E. Sakshaug, C.C.E. Hopkins, and N.A. Oritsland, p.239-243, 38 refs.

The paradigm of the pelagic food web organization in antarctic waters is undergoing fundamental revision, due to recent evidence that large fractions of material and energy flow through the microbial food web. Because of the unique antarctic ecosystem conditions, the microbial food web performs some roles that are fundamentally different from those in oligotrophic temperate and tropical waters: 1) during winter, bacterial production, at the expense of slow-turnover (DOM (dissolved organic matter) from the previous summer, could be a significant factor in the survival of overwintering animal populations; 2) microbial regeneration of ammonium in nitrate-replete antarctic waters may spare the reductants necessary for nitrate assimilation and thus enhance primary productivity of deep-mixed light-limited phytoplankton; and 3) the small diatoms and phytoflagellates which dominate the antarctic pelagic primary production are apparently directly digestible by the metazoan herbivores, whereas cyanobacteria which dominate the primary productivity in lower latitude oligotrophic waters are not. These roles performed by the microbial loop may, in part, explain why antarctic waters, in contrast to the lower latitude oligotrophic waters, have high levels of tertiary productivity despite low primary productivity. (Auth.)

B-46706

Billen, G., Becquevort, S., **Phytoplankton-bacteria relationship in the antarctic marine ecosystem,** *Polar research,* Dec. 1991 10(1), Pro Mare Symposium on Polar Marine Ecology, Trondheim, Norway, May 1990. Proceedings, edited by E. Sakshaug, C.C.E. Hopkins, and N.A. Oritsland, p.245-253, 46 refs.

Time series data of phytoplanktonic and bacterial biomass during the ice retreat period at different latitudes in the Weddell Sea and Prydz Bay areas show a distinct delay in the development of bacteria with respect to phytoplankton. Use of a general ecophysiological model of bacterial growth, along with direct in situ measurements of growth and mortality rates, allowed the simulation of the observed timing of bacterial development. It is suggested that the uncoupling between phytoplanktonic and bacterial development at the earliest stage of the spring ice-edge algal bloom is not the result of the low temperatures occurring in the southern ocean, but rather is due to the macromolecular nature of the dissolved organic matter released from phytoplankton. (Auth.)

B-46707

Mathot, S., Becquevort, S., Lancelot, C., **Microbial communities from the sea ice and adjacent water column at the time of ice melting in the northwestern part of the Weddell Sea,** *Polar research,* Dec. 1991 10(1), Pro Mare Symposium on Polar Marine Ecology, Trondheim, Norway, May 1990. Proceedings, edited by E. Sakshaug, C.C.E. Hopkins, and N.A. Oritsland, p.267-275, 38 refs.

Microbial composition—including microalgae, bacteria and protozoans—and potential metabolic activity of its autotrophic compartment were measured in Dec. 1988 in several micro-environments that characterize the northwest sector of the marginal area of the Weddell Sea; infiltration and band assemblages of ice floes and adjacent waters were investigated. At the time of ice melting, a shift from a diatom dominated population (ice) to a flagellate dominated population (water column) was observed. Nevertheless, this shift was not due to an "inability" of the ice-diatoms to grow in the water column. Macrograzing and/or sedimentation are suggested as possible causes of the disappearance of diatoms during ice melting. The remaining small autotrophic forms released by the ice would constitute a significant seeding stock for the growth of ice-edge blooms. (Auth.)

B-46708

Clarke, A., Peck, L.S., **Physiology of polar marine zooplankton,** *Polar research,* Dec. 1991 10(2), Pro Mare Symposium on Polar Marine Ecology, Trondheim, Norway, May 1990. Proceedings, edited by E. Sakshaug, C.C.E. Hopkins, and N.A. Oritsland, p.355-369, Refs. p.366-369.

The polar marine environment is characterized by low stable temperatures with seasonal variations ranging from 3 C at lower latitudes to only 0.2 C at high latitudes. The arctic basin is dominated by multi-year ice, whereas the Antarctic is subject to large seasonal changes in the cover by annual sea ice. Primary production is intensely seasonal nearshore but probably less so in offshore waters where significant production is associated with the marginal ice zone. Oxygen consumption in polar zooplankton is low compared with temperate and tropical species. Annual growth rates are generally slow and, especially in herbivores, highly seasonal. Lipid stores in polar herbivorous zooplankton are generally high, although some euphausiids and gelatinous zooplankton also rely on degrowth to provide energy over winter. Ice-edge blooms are of great importance to the polar marine food web although the quantitative significance of winter feeding under ice has yet to be resolved. Comparison of data on lipid storage and oxygen consumption for polar zooplankton indicates that there are large differences in the energy requirements of benthos and crustacean zooplankton. In contrast, gelatinous zooplankton (salps, ctenophores, medusae and siphonophores) have a low energy throughout related to a body composition, which renders them essentially neutral in buoyancy and a slow but efficient means of locomotion. Under good feeding conditions many species can therefore grow and reproduce very rapidly. (Auth. mod.)

B-46709

Yen, J., **Predatory feeding behavior of an antarctic marine copepod, *Euchaeta antarctica*,** *Polar research,* Dec. 1991 10(2), Pro Mare Symposium on Polar Marine Ecology, Trondheim, Norway, May 1990. Proceedings, edited by E. Sakshaug, C.C.E. Hopkins, and N.A. Oritsland, p.433-442, 24 refs.

Adult females of *Euchaeta antarctica* are exclusive carnivores, exhibiting highest feeding rates on prey having a prosome length of 120 microns. The size of these preferred prey was 65% the length of the second basipodal segment of the maxilliped, the main appendage used in prey capture by *E. antarctica.* These prey, juvenile stages of *Metridia gerlachei,* also were the most abundant prey available in the plankton. A three-week starvation period caused less than a 1.5 fold increase in the feeding rate. Maximum volume effectively searched by this predatory copepod was 2.4 l/d. Fecal pellets were produced at a constant rate of 0.697 pellets/h; this rate was not influenced by the level of gut fullness. Assuming that the rate of egestion is equal to the rate of ingestion, prey were ingested at a rate of 1.14/h. Many of the field-caught copepods evacuated 3-5 pellets which converts to 5-8 copepod prey ingested. This in situ meal more than adequately covers their daily respiratory costs. Smaller predators, CIV and CV *E. antarctica,* exhibited higher rates on smaller prey while males did not feed at all. The younger and potentially faster growing stage CIV consumed a higher proportion of their body weight per day than did the older mature predators; they were able to meet their metabolic costs on large and small prey. Older stages may not be able to obtain enough food to meet their metabolic needs during the late summer when prey availability is limited; they cease feeding and go into the overwintering state. (Auth. mod.)

B-46710

Hunt, G.L., Jr., **Occurrence of polar seabirds at sea in relation to prey concentrations and oceanographic factors,** *Polar research,* Dec. 1991 10(2), Pro Mare Symposium on Polar Marine Ecology, Trondheim, Norway, May 1990. Proceedings, edited by E. Sakshaug, C.C.E. Hopkins, and N.A. Oritsland, p.553-559, 81 refs.

The distribution and abundance of breeding and foraging seabirds are usually a reflection of the availability of prey in the marine ecosystems on which the birds depend. At the scale of hundreds of km, differences in marine communities may be reflected in variation in the species composition of resident seabirds. At small scales, environmental features such as fronts or ice can influence where birds will aggregate to forage. Features at which prey become concentrated near the surface are of particular importance to bird species dependent upon small planktonic organisms. Concentrations of foraging seabirds frequently indicate the presence of such features, or of areas of unusually high prey biomass. The absence of birds does not mean that concentrations of potential prey are absent. "Assembly rules" are proposed, by which one might predict aspects of the marine environment that birds should use in selecting foraging areas.

B-46715

Arcos, F., Bonilla, M.A., **Relative abundance of zooplankton in the Bransfield Strait, 1987-1988** [Composición y distribución de la abundancia relativa de zooplancton en el Estrecho Bransfield (Antártica) durante el verano austral de 1987-1988], *Acta antártica ecuatoriana,* 1989 Vol.1(1), p.104-109, In Spanish with English summary. 12 refs.

A qualitative and quantitative analysis of zooplankton components from 23 stations in the Bransfield Strait is presented; the distribution of the relative abundance of each group is determined. The highest zooplankton abundance is noted at the north of the Strait, with dominance of copepods and euphausiids, which were collected mostly as juveniles. The abundance of eggs found in the southeastern area suggests a transport of euphausiids from the Weddell Sea.

B-46717

Holloway, H.L., Jr., Gee, R.J., **Vesicles in the proboscis of Acanthocephala,** *Journal of parasitology,* 1990 76(4), p.585-587, 4 refs.

An isolated fluid-filled vesicle in the proboscis of *Corynosoma hamanni* from seals is redescribed as the anterior end of the dorsal wall of the inner muscle layer of the proboscis receptacle. (Auth.)

B-46718

Block, W., **To freeze or not to freeze? Invertebrate survival of sub-zero temperatures,** *Functional ecology,* 1991 Vol.5, p.284-290, 34 refs.

In this paper one particular aspect of low temperature tolerance is highlighted: whether an invertebrate can tolerate and survive the effects of freezing. The phenomena of freezing tolerance and intolerance are briefly discussed together with their perceived advantages and disadvantages. The question of switching from one to the other is addressed, and proposals are made for future experimental work to resolve some of the outstanding problems.

B-46720

Clarke, A., **Cold adaptation,** *Journal of zoology, London,* 1991 Vol.225, p.691-699, 36 refs.

In general terms, cold adaptation is defined as follows: it encompasses all those aspects of an organism's anatomy, physiology, biochemistry and behavior that allow it to survive in low temperature environments such as polar and alpine regions. Cold adaptation is thus essentially no more than a specific example of the more general adaptation any organism must have to the particular thermal features of its environment, and polar fish are cold adapted in the same sense that fish living on a tropical reef are warm adapted. The literature of temperature physiology in relation to cold tolerance and cold adaptation is reviewed, combining where possible historically important references with recent reviews.

B-46721

Harrisson, P.M., Block, W., Worland, M.R., **Moisture and temperature dependent changes in the cuticular permeability of the antarctic springtail *Parisotoma octooculata* (Willem),** *Revue d'écologie et de biologie du sol,* 1990 27(4), p.435-448, Refs. p.446-448.

This paper provides an introduction to the theories which describe and predict how hygroscopic porous solids dry, and discusses their relevance to the drying of Collembola. In the maritime Antarctic, the rate of drying of *P. octooculata* is highly dependent on both moisture content and air temperature. The cuticular conductances of 16 species of Collembola from various habitats are calculated and compared; results show the drier the habitat, the lower the conductance value. (Auth.)

B-46734

Van Klinken, R.D., Green, A.J.A., **First record of Oniscidea (terrestrial Isopoda) from Macquarie Island,** *Polar record,* July 1992 28(166), p.240-242, 15 refs.

The first species of terrestrial Isopoda (Oniscidea) to be recognized on Macquarie I. was *Styloniscus otakensis* [Chilton, 1901] (Styloniscidae). This paper discusses the zoogeography of *S. otakensis* and its possible introduction from New Zealand, and lists the distributions of other Styloniscidae on southern islands. *S. otakensis* offers a unique opportunity to study the ecology of a locally rare invertebrate species on a subantarctic island.

B-46740

Inoue, M., **Lecideoid lichens of Prince Olav Coast and Sôya Coast, Enderby Land, East Antarctica,** *Antarctic record,* Nov. 1991 35(3), p.271-284, 28 refs.

Five species of lecideoid lichens belonging to three genera are reported as new to the flora of the Prince Olav and the Sôya Coasts: *Carbonea capsulata* (Dodge & Baker) Hale, *Lecidea andersonii* R. Filson, *Lecidea cancriformis* Dodge & Baker, *Lecidea soyaensis* M. Inoue and *Lecidella siplei* (Dodge & Baker) M. Inoue. All are endemic to Antarctica. An examination was made of the collections from the region during Jan. 1986 and Feb. 1987. The type and authentic specimens of possibly related species have been restudied. *L. soyaensis* M. Inoue is new to science and *L. siplei* (Dodge & Baker) M. Inoue is proposed as a new combination. Taxonomic and chemical data as well as a key to the known taxa are provided. (Auth. mod.)

B-46741

Ohtani, S., Akiyama, M., Kanda, H., **Analysis of antarctic soil algae by the direct observation using contact slide method,** *Antarctic record,* Nov. 1991 35(3), p.285-295, 13 refs.

The species composition and distribution of soil algae *in situ* were investigated using the contact slide method with reference to the available water in soils of the Yukidori Valley. Glass slides were buried vertically at 5 sites at a few meter intervals along a stream for one year, beginning in Jan. 1988. Eleven taxa of Cyanophyceae, 8 taxa of Chlorophyceae and 4 taxa of Bacillariophyceae were recognized on the collected glass slides. *Actinotaenium cucurbita* (Ralfs) Teiling and *Pinnularia borealis* Ehrenb. were often dominant. Results of scanning electron microscopy showed that diatoms secreted thin mucilage, but a filamentous blue-green alga, *Lyngbya martensiana*

Menegh. secretes thick mucilage and adheres to the surface of glass slides. Both the species number and the algal cell number of the soil algae, and the chlorophyll content in soils, were well related to the water content of soils. Values of these 3 items were high at the nearest transect points to the stream where the water content of soils was high, and suddenly decreased at a few meters distance from the stream where the water content of soils was low. (Auth.)

B-46749

Ino, Y., **Estimation of the net production of moss community at Langhovde, East Antarctica,** *Antarctic record,* Mar. 1992 36(1), p.49-59, 13 refs.

Field measurements of net photosynthesis and dark respiration (CO2 exchange) of moss colonies were carried out in the Langhovde Hills from Jan. 9-17, 1988. Each colony growing in the Yukidori Valley was composed of *Grimmia lawiana, Bryum pseudotriquetrum* or the mixture of *Ceratodon purpureus* and *B. pseudotriquetrum.* Microclimatic data (photosynthetic photon flux density and moss temperature) in the assimilation chamber were recorded at the same time. A simple model to estimate the net photosynthetic rate and dark respiration rate on the basis of the microclimatic data was developed on Kappen's model. Net primary production of these moss colonies was calculated with the microclimatic data recorded separately in the Yukidori Valley from Jan. 1988 to Jan. 1989. The estimated net production rates ranged from 8.8 to 11.3 mol CO2/sq m/y, or from 230 to 296 gdw/sq m/y. (Auth.)

B-46750

Yamada, S., Tanimura, A., Minoda, T., **Copepods collected along 33.5E longitude of the antarctic ocean in the 1976 summer,** *Antarctic record,* Mar. 1992 36(1), p.60-64, 4 refs.

Zooplankton samplings were conducted at 6 stations along 33.5E in the Indian sector of the antarctic ocean from Feb. 25 to Mar. 2, 1976 by JARE. Vertical hauls from a depth of 200 m to the surface with a Norpac net (45 cm in diameter, 0.33 mm mesh openings) were carried out. Copepoda made up more than 85% of the total individual numbers of zooplankton at all stations. The species composition and abundance of copepods were investigated. A total of 18 species except for Oncaeidae were identified. *Calanus propinquus, Calanoides acutus, Rhincalanus gigas, Ctenocalanus vanus, Scolecithricella glacialis* and *Oithona similis* were found commonly at almost all stations. *Miclocalanus pygmaeus, Lucicutia* sp., *Haloptilus ocellatus, Haloptilus oxycephalus* and *Metridia gerlachei* occurred south of 60S and *Calanus simillimus, Clausocalanus laticeps, Metridia lucens* and *Oithona frigida* occurred north of 60S. *Euchaeta antarctica, Racovitzanus antarcticus* and *Heterorhabdus austrinus* occurred sporadically and/or in small numbers. (Auth.)

B-46753

Ohtani, S., Nakatsubo, T., **Japan-China collaboration research program on terrestrial biology at Great Wall Station on King George Island, in the summer of 1990/91,** *Antarctic record,* Mar. 1992 36(1), p.109-115, In Japanese with English summary. 2 refs.

Collaboration between Japanese and Chinese biologists was started in the 1988/89 season with a three-year program at the Great Wall Station. A taxonomic study of freshwater algae was carried out on Fildes Peninsula. About 110 taxa were recognized in the samples collected from a variety of freshwater habitats; the distribution of snow algae was studied with reference to microhabitat and snow properties. The microclimate and photosynthetic activities of moss colonies around Great Wall Station were also studied. Vertical cross-sections of moss colonies were examined to study their structure and dynamics. (Auth. mod.)

B-46757

Ryan, K.G., **UV radiation and photosynthetic production in antarctic sea ice microalgae,** *Journal of photochemistry and photobiology,* May 15, 1992 13(3-4), p.235-240, 20 refs.

During spring when ozone depletion is at its maximum, up to 10% of the surface UV radiation may penetrate antarctic sea ice to the algal community growing at the lower surface. These algae ultimately form a major portion of the food web in the southern ocean, and reduction in productivity due to enhanced UV radiation may have serious implications for all marine life. The small (5%) but statistically significant reduction in photosynthetic production observed as a result of UV treatment of ice microalgae indicates that the effect on these algae at least may not be as drastic as sometimes predicted. (Auth.)

B-46758

Fryxell, G.A., Garza, S.A., Roelke, D.L., **Auxospore formation in an antarctic clone of *Nitzschia subcurvata* Hasle,** *Diatom research,* 1991 6(2), p.235-245, 24 refs.

Several clones of an ice-related planktonic diatom, forming chains with overlapping tips, were isolated at Texas A&M University from a water sample collected near McMurdo Sound and later identified as *Nitzschia subcurvata* Hasle. After a week of log phase growth following the first transfer from a 5 ml microtest plate well in clone Mc-2, healthy, rapidly-growing cells clumped together in masses. Upon examination of the clumps, some free amoeboid-like cells were seen in fixed slides. The expanded auxospore had balloon-shaped walls, and the zygotes apparently developed into the elongate banded perizonium noted with complex organelles, or the initial cells formed inside. The empty parent cells were 52-58 microns in length, some vegetative cells were as small as 46 microns, while the newly formed, expanded cells were up to 92 microns long. Evidence of sexual reproduction has been little noted in marine planktonic *Nitzschia* species, although clumping has been recorded in the open ocean, and amoeboid bodies outside cells have been seen in coastal collections. Clumping is a growth habit commonly seen in stationary or senescent growth phases of cultures of related species as well as in other species in the section. Clone Mc-2 of *N. subcurvata* was tested for the possible production of the neurotoxic domoic acid in the senescent stage and tested negative. (Auth. mod.)

B-46759

Schumacher, U., Rauh, G., Plötz, J., Welsch, U., **Basic biochemical data on blood from antarctic Weddell seals *(Leptonychotes weddelli):* ions, lipids, enzymes, serum proteins and thyroid hormones,** *Comparative biochemistry and physiology,* July 1992 102A(3), p.449-451, 18 refs.

Standard laboratory values of blood samples taken from Weddell seals in Antarctica were determined. Numerous blood parameters are similar to those observed in man. Comparatively high cholesterol levels but normal triglyceride levels were observed when compared with humans. In comparison to laboratory findings in humans, T4 levels were decreased although T3 levels were normal. The levels of alkaline phosphatase are considerably higher than those in humans. The data obtained indicate different lipid and thyroid hormone metabolism in Weddell seals when compared with humans. (Auth.)

B-46760

Culik, B., **Diving heart rates in Adélie penguins *(Pygoscelis adeliae),*** *Comparative biochemistry and physiology,* July 1992 102A(3), P.487-490, 17 refs.

In Antarctica, two Adélie penguins were implanted with heart rate (HR) transmitters and released in their breeding colony where they resumed incubation. HR while at rest and lying in the colony were 67 and 77 beats per min (bpm), respectively. For diving experiments, the birds were introduced into a still-water canal 21 m long, with one respiration chamber at each end. The birds swam underwater for 49 and 76% of the time at speeds of 1.5 and 2.5 m/sec, respectively. When floating quietly at the surface, HR in the first penguin was 89 bpm. Pre-dive HR varied with duration of the inter-dive interval, being highest (250 bpm) when the bird dove in rapid succession (surface times <5 sec) and close to diving HR when surface time was 50 sec. Mean HR while diving was constant (107 bpm) and did not vary either with surface time or with time submerged (0-15 sec). Pre-dive HR and diving HR were not correlated. The extent of bradycardia upon immersion was dependent upon surface time. There was a good correlation between HR and oxygen consumption in both birds, suggesting that HR might be used to determine energy expenditure. (Auth.)

B-46762

Argentina. Instituto Antartico Argentino, The Netherlands. Rijkswaterstaat, Tidal Waters Division, **Environmental impact assessment associated with the salvage operation of the remaining oil of the *Bahia Paraiso*,** 1992, 52 leaves, 8 refs.

Following a description of the events leading to the grounding and subsequent capsizing of the *Bahia Paraiso* near Arthur Harbor on Jan. 28, 1989, a plan is presented for recovering the remaining oil on board the stricken vessel. This draft impact assessment identifies various biota at risk and estimates degrees of damage during the successive phases of the recovery process. Details are provided of the proposed activity and the environment in which it will proceed; methods and data used to forecast potential impacts; expected impacts and alternative options; mitigation measures and recommendations; monitoring the operation and the role of the EIA in the whole operation. A discussion section focusses on the proposed operation in view of the zero-option; the timing of the operation; the most vulnerable features of the environment; potentially, the most harmful effects of the operation; and mitigation measures.

B-46764

Camardella, L., **Haemoglobin of the antarctic fish *Pagothenia bernacchii.* Amino acid sequence, oxygen equilibria and crystal structure of its carbonmonoxy derivative,** *Journal of molecular biology,* Mar. 20, 1992 24(2), p.449-460, 29 refs.

The antarctic fish *Pagothenia bernacchii* has one major haemoglobin, Hbl (over 95% of the total blood content). Hbl has a strong alkaline Bohr effect and at low pH exhibits the reduced ligand affinity and cooperativity that comprise the Root effect. The authors have determined the complete amino acid sequence of *P. bernacchii* Hbl and also the structure of its carbonmonoxy derivative by X-ray crystallography, to a resolution of 2.5 Å. The crystallographic *R*-factor of the refined structure is 18%. The three-dimensional structure of this fish haemoglobin is similar to that of human haemoglobin A, with a root- mean-square difference in main-chain atom positions of 1.4 Å after superimposition of the two structures, despite only 48% homology of their amino acid sequences (including insertion of a single residue in the CD region of the fish alpha-chain). Large structural differences occur only at the N and C termini of both the alpha- and beta-chains. Neither these nor other smaller structural differences provide any obvious explanation of the Root effect of this or other fish haemoglobins. (Auth.)

B-46766

Mesphoulhé, P., David, B., **Growth dynamic of a sea urchin from Kerguelen Islands** [Stratégie de croissance d'un oursin subantarctique: *Abatus cordatus* des îles Kerguelen], *Académie des sciences, Paris. Compte rendus Série III,* Feb.27,1992 314(5), p.205-211, In French with English abridgement and summary. 20 refs.

Three populations of *Abatus cordatus* (Spatangoida: Schizasteridae) from the Kerguelen Is. were studied from Nov. 1988 to Jan. 1990. The timing of developmental stages is depicted. It displays low range disparities between specimens from the same settlements that induce overlapping of brooding stages. Larger disparities, ranging to several months, occur between different settlements, and the reproductive cycle of the species appears to be independent of the seasons. The growth is analyzed by fitting age-groups to the size-frequency distributions. The relatively slow growth rate recorded during the first 2 years attests to the particularity of the growth dynamic of this brooding species when compared to other sea urchins. (Auth.)

B-46767

Bloomer, J.P., Bester, M.N., **Effects of hunting on population characteristics of feral cats on Marion Island,** *South African Journal of wildlife research,* Dec. 1991 21(4), p.97-102, With Afrikaans summary. 28 refs.

The effects of three seasons of hunting on characteristics of a feral cat population on subantarctic Marion I. are evaluated. Hunting pressure fell mainly on adults, resulting in the population becoming progressively younger. Adult year-class age structures and sex ratios did not change, indicating that no adult group was particularly vulnerable to hunting. Proportions of females breeding and number of litters per female per year decreased, resulting in a decrease in mean fecundity. Lower fecundity is thought to be a consequence of lower encounter rates between males and females at lowered densities. Using several methods, estimates of population size varied greatly. The only real indication of the decrease in density was the drastic increase in the number of hours hunted at night per cat seen: from 1,3 h per cat at the start of the first season to 8,3 h by the end of the third season. (Auth.)

B-46770

Drew, E.A., Hastings, R.M., **Year-round ecophysiological study of *Himantothallus grandifolius* (Desmarestiales, Phaeophyta) at Signy Island, Antarctica,** *Phycologia,* May/July 1992 31(3/4), p.262-277, 32 refs.

Field studies carried out on the antarctic brown macroalga *Himantothallus grandifolius* (A. Gepp et E.S. Gepp) A.D. Zinova (Desmarestiales, Phaeophyta) during two summers and the intervening winter season are described. Monitoring of plant growth by the punched-hole technique shows that elongation of the lamina stops a month before the onset of fast sea-ice in the austral autumn, but begins again a month before sea-ice break-out. *In situ* photosynthesis measurements carried out at 2-week intervals show that net carbon accretion also ceases as early as March, two months prior to formation of the sea-ice, and recommences before sea-ice break-out. A short period of high carbon accretion occurs immediately after the ice has gone, but this soon decreases abruptly due to reduction of underwater irradiance by a dense phytoplankton bloom during mid-summer. The high rates of carbon accretion do not recommence even after the bloom decays, because water clarity is by then dramatically reduced by terrestrial run-off and turbid glacial melt-water. Nutrient levels are sufficiently high throughout the year to support maximal rates of macroalgal photosynthesis, but water temperature seldom reaches even 1 C, resulting in relatively low metabolic rates. However, these are still sufficient to produce photosynthetic rates up to 9 micrograms C/sq cm/h at a saturation irradiance of 10 W/sq m, and carbon loss due to dark respiration of up to 2 micrograms C/sq cm/h. (Auth.)

B-46799

Natoli, G., **Icefish *(Chaenocephalus aceratus)* Cu,Zn superoxide dismutase. Conservation of the enzyme properties in extreme adaptation,** *Comparative biochemistry and physiology,* 1990 95B(1), p.29-33, 26 refs.

A Cu,Zn superoxide dismutase has been isolated from the liver of the icefish *Chaenocephalus aceratus,* an antarctic teleost which lacks both hemoglobin and myoglobin and is highly adapted to low temperature. The isolated protein exhibited structural and functional properties which are typical of this class of enzymes. The catalytic constant was determined to be 3.75 billion/M sec, which is among the highest found for Cu,Zn superoxide dismutase. The activity was sensitive to ionic strength, pH and temperature changes as well as to inhibitors (cyanide, hydrogen peroxide and phenylglyoxal) in the same fashion as for the bovine enzyme. (Auth.)

B-46800
Brandt, A., **Origin of antarctic isopoda (crustacea, Malacostraca),** *Marine biology,* July 1992 113(3), p.415-423, 83 refs.

An analysis of the horizontal and the vertical zonation of the antarctic Isopoda, combined with knowledge of the geological history of Antarctica and isopod phylogeny, revealed that the isopod family Serolidae and subfamily Arcturinae are likely to have evolved from ancestors that inhabited a cold-temperate Gondwanian province. Antarctic species of other families, such as the Munnopsidae, Nannoniscidae, Desmosomatidae and Ischnomesidae, are likely to have evolved from deep-sea ancestors. It is deduced that emigration of South Patagonian species into the southern ocean, although possible, probably did not occur very often. Evolutionary phenomena such as continental-drift vicariance, radiation of species on the continental shelf of Antarctica, and active migration, including submergence and emergence mechanisms, are discussed. (Auth.)

B-46802
Huber, B.T., **Paleobiogeography of Campanian-Maastrichtian foraminifera in the southern high latitudes,** *Palaeogeography, palaeoclimatology, palaeoecology,* Apr. 1992 92(3/4), p.325-360, Refs. p.356-360.

Poleward changes in the diversity of total and keeled planktonic species of the Southern Hemisphere are compared for the early and late Campanian and early and late Maastrichtian. Latitudinal diversity gradients were weakest during the early Campanian and more pronounced during the late Campanian and Maastrichtian. Shallow marine seaways within West Antarctica are suggested by similarity of Late Cretaceous nearshore benthic and open ocean planktonic assemblages from southern high-latitude land and drill sites, and by the occurrence of recycled Cretaceous marine microfossils from antarctic interior and continental margin localities. Development of a major water mass boundary between cool surface waters south of about 50S paleolatitude and warmer surface waters to the north in the South Atlantic and Indian Ocean may have caused biogeographic isolation of Austral Realm assemblages during the late Campanian and early Maastrichtian time. The distribution of *A. mayaroensis* is in agreement with isotopic evidence for late Maastrichtian climatic cooling, while that of *P. elegans* correlates with a latest Maastrichtian warming event (about 66.8-66.6 Ma). Delayed first occurrences of the other taxa cannot be explained by paleoclimatic factors alone; variations in global eustatic sea-level and orogeny between southern South America and West Antarctica may have also influenced the taxonomic composition of southern high-latitude foraminiferal assemblages. (Auth. mod.)

B-46803
Söchting, U., Övstedal, D.O., **Contributions to the *Caloplaca* flora of the western antarctic region,** *Nordic journal of botany,* 1992 12(1), p.121-134, 47 refs.

Fourteen species of the lichen genus *Caloplaca* are recorded from the western antarctic region and described morphologically and anatomically, viz.: *C. ammiospila, C. approximata, C. athallina, C. cirrochrooides, C. citrina, C. isidioclada, C. lucens, C. millegrana, C. regalis, C. sublobulata, C. tenuis,* and *C. aff. anchon-phoeniceon.* Type specimens of critical species have been studied. A key is provided to the species. *C. ammiospila* and *C. approximata* are reported as new to the antarctic region. (Auth.)

B-46805
Dieckmann, G.S., Arrigo, K., Sullivan, C.W., **High-resolution sampler for nutrient and chlorophyll *a* profiles of the sea ice platelet layer and underlying water column below fast ice in polar oceans: preliminary results,** *Marine ecology progress series,* Mar. 1992 80(2-3), p.291-300, 39 refs.

Fourteen profiles of inorganic nutrients and chl *a* were obtained using ADONIS under fast ice near McMurdo Station. All profiles revealed highest chl *a* concentrations at the congelation/platelet ice interface. Maximum chl *a* concentration, under 2.5 m congelation ice, ranged between 5.20 and 853 microgram/l from 26 Oct. to 3 Dec. 1989, but was only 0.35 microgram/l under 4 m thick ice with a 0.4 m snow cover. Ammonium concentrations in the interstitial water of the platelet ice layer always exceeded those in the underlying water column by at least an order of magnitude, with maximum values per profile ranging from 3.20 to 178 micromol NH4/l. Concentrations of phosphate, nitrate, and silicic acid in the platelet ice layer differed only slightly from those in the water column, except in the presence of high algal biomass, where they were somewhat depleted but never exhausted. By the end of November, ammonium and phosphate at the interface of the congelation/platelet ice layer had increased slightly relative to water column concentrations, indicating that regeneration exceeded uptake. Growth of the sea ice microbial community in the platelet layer does not appear to be nutrient-limited, as nutrients are apparently replenished by an adequate and efficient water exchange mechanism between platelet layer and underlying water column. (Auth. mod.)

B-46812
Melick, D.R., Broady, P.A., Rowan, K.S., **Morphological and physiological characteristics of a non-heterocystous strain of the cyanobacterium *Mastigocladus laminosus* Cohn from fumarolic soil on Mt. Erebus, Antarctica,** *Polar biology,* May 1991 11(2), p.81-89, 21 refs.

An unusual strain of the thermophilic cyanobacterium *Mastigocladus laminosus* occurs on warm soils on the Mt. Erebus volcano. It differs morphologically from the two genetically distinct forms described from thermal habitats elsewhere. Heterocysts are lacking and true-branching is rare. Its photosynthetic rate, and the contrasting rates of two less thermotolerant algae from Mt. Erebus soils, *Phormidium fragile* (Cyanobacteria) and *Pseudococcomyxa simplex* (Chlorophyta), were measured over the range -2 to 62 C. The optimum temperature range of *M. laminosus* was 35 to 50 C. Photosynthetic response to temperature of all three algae in the laboratory correlated well with distribution patterns in the field, confirming that zonation patterns were temperature controlled. *M. laminosus* retained viability following exposure to deep-freezing, freeze-thaw cycles and desiccation. Discussion suggests the alga would survive long-distance airborne dispersal in the desiccated condition, but would not survive the duration of overwinter darkness on moist soils at the warmer end of its range of occurrence in the field. (Auth. mod.)

B-46813
Smith, R.I.L., Övstedal, D.O., **Lichen genus *Stereocaulon* in Antarctica and South Georgia,** *Polar biology,* May 1991 11(2), p.91-102, Refs. p.101-102.

Six species of *Stereocaulon* and one unnamed taxon (close to *S. glabrum)* are reported from South Georgia, the maritime antarctic islands and Antarctic Peninsula. *S. caespitosum* is new to the western subantarctic. Variations in morphology and secondary chemistry are provided, and the ecology and geographical distribution in the subantarctic and antarctic biomes are given for each taxon. (Auth.)

B-46814

Alder, V.A., Boltovskoy, D., **Microplanktonic distributional patterns west of the Antarctic Peninsula, with special emphasis on the Tintinnids,** *Polar biology,* May 1991 11(2), p.103-112, Refs. p.111-112.

Microplankton was sampled with a centrifugal suction pump in the surface layer (approx. 9 m) of the Bellingshausen Sea and the Bransfield Strait in Mar. 1987. Bulk microplanktonic settling volumes were assessed, silicoflagellates and large thecate dinoflagellates were counted, and tintinnids were counted and identified by species. The three geographic zones defined objectively on the basis of tintinnid specific assemblages also differed sharply in their surface salinity, overall microplanktonic abundance and bulk settling volume. The Bransfield Strait, with lowest settling volume values (2.1 ml/cu m) and cell concentrations, was characterized by the dominance of *Cymatocylis affinis/convallaria.* In waters around the tip of the Antarctic Peninsula microplanktonic settling volumes averaged 4.6 ml/cu m, cell concentrations were intermediate, and 79% of the tintinnids were represented by *Codonellopsis balechi.* The Bellingshausen Sea was characterized by the lowest salinities and the highest settling volumes (8.7 ml/cu m) and cell counts; *Laackmanniella* spp. and *Cymatocylis drygalski,* f. typica dominated this area. (Auth. mod.)

B-46815

Kellermann, A., Schadwinkel, S., **Winter aspects of the ichthyoplankton community in Antarctic Peninsula waters,** *Polar biology,* May 1991 11(2), p.117-127, Refs. p.126-127.

Ichthyoplankton was sampled off the Antarctic Peninsula coast in May and June 1986. A total of 153 eggs from two species and 1368 larvae or juvenile stages from 12 species were obtained. These included pelagic species and demersal species with a long pelagic larval or juvenile phase. Most abundant were larvae of *Pleuragramma antarcticum* and *Notothenia kempi,* and eggs of *Notothenia neglecta.* The distribution of notothenioid and paralepidid larvae was apparently unaffected by ice cover, whereas myctophid larvae were confined to ice-free waters. Areas where newly hatched *Chionodraco hamatus* occurred coincided with dense aggregations of *Euphausia superba* (krill) furcilia larvae which is a potential food resource during winter. The hatching of icefish larvae during winter is apparently independent of the seasonal production cycle. Epipelagic eggs of *N. neglecta* were found during the spawning season, which suggests that eggs ascend to the surface after demersal spawning and that development takes place near the sea surface during winter. Larvae of *N. kempi* were chiefly confined to shelf and slope waters to the west of the Antarctic Peninsula, with larger larvae found in coastal shelf areas. *P. antarcticum* occurred in the coastal waters off the Biscoe Is., in the Gerlache Strait, and in the northern Bransfield Strait. (Auth. mod.)

B-46816

Attwood, C.G., **Production and standing stocks of the kelp *Macrocystis laevis* Hay at the Prince Edward Islands, Subantarctic,** *Polar biology,* May 1991 11(2), p.129-133, 28 refs.

The recently described species *Macrocystis laevis* Hay is endemic to the Prince Edward Is. Aerial photographs of Marion I. were used to outline the distribution of the kelp and to assess its cover. *M. laevis* occurs along the lee shore of the island, between the 5 and 20 m isobaths. Plant densities and gross plant morphology were measured by divers during Apr./May 1988. Net production was estimated from growth measurements taken in Apr./May 1988 and 1989 and again during Aug. 1989. The mean biomass of kelp was 0.67 kgC/sq m within the kelp beds. Net production was estimated at 7.7 gC/sq m/d and 11.5 gC/sq m/d during the months of Apr. and Aug. respectively. *M. laevis* had a uniform frond-length frequency distribution, which suggests that only the oldest fronds are lost by wave action or senescence. Based on calculations for *M. laevis* and *Durvillaea antarctica* (the two species making up most of the macrophyte biomass), macrophytes are more productive per unit area than the phytoplankton, but contribute less to the seas around the Prince Edward Is. by virtue of their small spatial coverage. (Auth. mod.)

B-46817

Endo, Y., Kadoya, N., **Colorimetry of the hepatopancreas in antarctic krill, *Euphausia superba*,** *Polar biology,* May 1991 11(2), p.135-137, 4 refs.

Hepatopancreas color of freshly caught as well as starved *Euphausia superba* was examined by a chroma meter to express it quantitatively and compare it with plant pigment contents. There was a high positive correlation (r=0.77) between plant pigment contents of hepatopancreas and the purity (vividness) of hepatopancreas color, and a negative correlation between the pigment contents and the luminosity (brightness) of the color. During the starvation experiment the purity decreased from 0.480 to 0.198 during the first 6 days in accordance with the decrease in plant pigment contents from 4.7 to 0.9 micrograms/krill. Examination of hepatopancreas color by a chroma meter proved an easy and quantitative way of learning the feeding condition of *E. superba.* (Auth.)

B-46818

McKenzie, C.H., Cox, E.R., **Spatial and seasonal changes in the species composition of armored dinoflagellates in the southwestern Atlantic Ocean,** *Polar biology,* May 1991 11(2), p.139-144, Refs. p.143-144.

To compare the spatial and temporal (seasonal) distribution of dinoflagellates, vertical net hauls were taken along similar cruise tracks in the Scotia Sea, Weddell Sea and across the Polar Front Zone in the austral spring and the austral fall. Sixty-three species of armored dinoflagellates were identified and enumerated. Chi-square and hierarchical cluster analyses were performed to define spatial and seasonal patterns in genera and species assemblages. The dominant genera were *Protoperidinium, Dinophysis* and *Ceratium.* The Polar Front Zone was an important biogeographical barrier with *Blepharocysta, Gonyaulax, Heteroschisma, Oxytoxum* and *Podolampas* occurring mainly north of the Front. Species found primarily in the austral spring were *Ceratium fusus, Ceratium lineatum, Dinophysis antarctica, Dinophysis simplex, Gonyaulax digitale, Protoperidinium pyriforme* and *Protoperidinium variegatum.* Austral fall species included *Dinophysis tuberculata* and *Protoperidinium elegantissum.* (Auth. mod.)

B-46819

Makarov, R.R., Men'shenina, L.L., **Larvae of euphausiids off Queen Maud Land,** *Polar biology,* Mar. 1992 11(8), p.515-523, 32 refs.

In a Mar. 1981 study off the coast of Queen Maud Land, *Euphausia superba* and *Thysanoessa macrura* larvae were abundant in the north and northwest part of the region, near the frontal zone between the Weddell Warm Countercurrent (WWC) and the Weddell Gyre. Toward the south, *E. superba* and *E. crystallorophias* larvae were numerous in the frontal zone between the WWC and the Antarctic Coastal Current. Only *T. macrura* larvae occurred in the central part of the sea. The age composition of larvae was most advanced in *T. macrura,* probably due to the drift of larvae from the northwest. Because the ice cover diminishes later in the flow from the Weddell Gyre than in the south, *E. superba* larvae were younger in that oceanic subregion than near the shore. *T. macrura* larvae were sparse near the coast and the onshore-offshore age difference was not pronounced. Both frontal zones correspond to reproductive areas of *E. superba* and *T. macrura, E. crystallorophias* spawns only in the southern area. (Auth.)

B-46820
Fraser, W.R., Trivelpiece, W.Z., Ainley, D.G., Trivelpiece, S.G., **Increases in antarctic penguin populations: reduced competition with whales or a loss of sea ice due to environmental warming?,** *Polar biology,* Mar. 1992 11(8), p.525-531, Refs. p.530-531.

A central tenet of antarctic ecology suggests that increases in Chinstrap penguin *(Pygoscelis antarctica)* populations during the last 4 decades resulted from an increase in prey availability brought on by the decrease in baleen whale stocks. The authors question this tenet and present evidence to support the hypothesis that these increases are due to a gradual decrease in the frequency of cold years with extensive winter sea ice cover resulting from environmental warming. Supporting data were derived from one of the first major multidisciplinary winter expeditions to the Scotia and Weddell Seas; recent satellite images of ocean ice cover; and the analysis of long-term surface temperature records and penguin demography. The observations indicate there is a need to pay close attention to environmental data in the management of southern ocean resources, given the complexity of relating biological changes to ecological perturbations. (Auth.)

B-46821
Gutt, J., Gerdes, D., Klages, M., **Seasonality and spatial variability in the reproduction of two antarctic holothurians (Echinodermata),** *Polar biology,* Mar. 1992 11(8), p.533-544, Refs. p.543-544.

Seasonality in the reproduction of *Ekmocucumis steineni* and *Psolus dubiosus* (Holothuroidea) from the antarctic shelf was investigated. The material was collected in spring (Oct./Nov. and autumn, mainly Feb.) in the southeastern Weddell Sea. For *E. steineni* differences between both seasons in relative female fecundity and relative gonad weight were found in both sexes. Large yolky oocytes (0.3-1.0 mm in diameter) forming 1-3 cohorts were present in spring, nearly none in autumn. No seasonal differences were found in *P. dubiosus,* a brood-protecting species with a lower fecundity and larger eggs (1.5 mm in diameter). A longer spawning phase in *P. dubiosus* than in *E. steineni* (Oct. to Jan.) is suggested. Both species are suspension feeders and their intestines were more filled with organic material in autumn than in spring. However, the occurrence of mature oocytes was not directly linked with the seasonal availability of food. The size-frequency distribution of the entire material in the study area was heterogeneous, indicating differences in long-term environmental conditions. The data show an evolutionarily more evolved high antarctic mode of reproduction in *P. dubiosus* with a prolonged reproductive period than in *E. steineni,* which has a distinct annual spawning cycle. (Auth.)

B-46822
Beckley, L.E., Branch, G.M., **Quantitative scuba-diving survey of the sublittoral macrobenthos at subantarctic Marion Island,** *Polar biology,* Mar. 1992 11(8), p.553-563, Refs. p.562-563.

A scuba-diving survey of the macrobenthos of hard substrata in the sublittoral zone at Marion I. was conducted during Mar. and Apr. 1988. Dense beds of the kelp *Macroxystis laevis* occur at depths >5 m. *Durvillaea antarctica* is found along the infralittoral fringe and *Desmarestia rossi* and *Durvillaea* sp. occur at 3-6 m. Under-storey algae (chiefly rhodophytes) tend to decrease in biomass with depth. Encrusting coralline algae are particularly abundant in shallow areas. Total biomass of macrozoobenthos increased with depth. Approximately 200 species of macrobenthic animals were recorded; numerically, polychaetes, crustaceans, molluscs, nematodes and echinoderms dominated. The sublittoral benthos at Marion I. is compared with that occurring at other subantarctic and antarctic islands, in particular the Kerguelen Is. Zoogeographic trends and the possible effects of nutrient input from seabird guano are briefly discussed. (Auth. mod.)

B-46823
Daneri, G.A., Coria, N.R., **Diet of antarctic fur seals, *Arctocephalus gazella,* during the summer-autumn period at Mossman Peninsula, Laurie Island (South Orkneys),** *Polar biology,* Mar. 1992 11(8), p.565-566, 11 refs.

From mid Jan. to Apr. 1988 a total of 105 faecal samples of non-breeding male fur seals, *Arctocephalus gazella,* were collected at Mossman Peninsula, Laurie I. Examination of scats containing prey remains showed that fur seals fed mainly on krill, occurring in 100% of samples, but fish were also a common food item (78.8%). Myctophids constituted more than 90% of fish taken by fur seals. Squid beaks occurred in 34.3% of scats, being more common in the autumn period. (Auth.)

B-46824
Andreoli, C., Scarabel. L., Spini, S., Grassi, C., **Picoplankton in antarctic lakes of northern Victoria Land during summer 1989-1990,** *Polar biology,* Mar. 1992 11(8), p.575-582, Refs. p.581-582.

Photoautotrophic picoplankton is reported from some lakes located near the Terra Nova Bay Station. Observations, carried out by both flow cytometry on water samples and electron microscopy on micro-organisms in cultures from each lake, have confirmed the occurrence in all the environments studied of this fraction accounting, in several cases, for more than 50% of the phytoplankton, measured as chlorophyll. Cultures of the picoplankton fraction from these waters contained known prokaryotic *(Synechococcus)* and eukaryotic *(Chlorella)* genera as well as two unidentified entities, possibly prochlorophytes. (Auth.)

B-46825
Ryan, S.N., **Susceptibility of the antarctic fish *Pagothenia borchgrevinki* to MS-222 anaesthesia,** *Polar biology,* Mar. 1992 11(8), p.583-589, Refs. p.588-589.

Induction of anaesthesia and distribution of the routinely used fish anaesthetic, MS-222 (ethyl *m*-aminobenzoate methanesulfonate), were monitored in the antarctic fish *Pagothenia borchgrevinki.* As expected from the extremely low metabolic rate of antarctic fish, induction times were significantly longer than those from rainbow trout. Onset of anaesthesia in antarctic fish also failed to correlate with either brain or blood MS-222 concentrations, in contrast to the trends observed in freshwater salmonids. High levels of free MS-222 in liver and in the aglomerular kidney, and the presence of acetylated derivatives in the blood, suggest these organs as primary sites of drug metabolism. MS-222 anaesthesia in *P. borchgrevinki* is also accompanied by dose-dependent changes in haematological parameters. (Auth.)

B-46826
Bölter, M., **Environmental conditions and microbiological properties from soils and lichens from Antarctica (Casey Station, Wilkes Land),** *Polar biology,* Mar. 1992 11(8), p.591-599, 32 refs.

Microbial habitats of an antarctic coastal terrestrial environment are described. Emphasis was laid on soil with different contents of organic matter and some representative lichen species. Parameters for this description were microclimatic conditions, organic and inorganic matter, epifluorescence microscopy, and parameters describing microbial and enzymatic activity. The data of direct measurements of bacterial standing stock (number and biomass) and of exoenzymatic activity via FDA-hydrolysis were found to be the most valuable parameters for microbiological properties. The data show significant differences with regard to nutrients and microbial activity. Scales of patches are only a few square decimeters, with wide ranges of environmental and microbiological properties within short distances. (Auth.)

B-46827

Line, M.A., **Nitrogen fixation in the subantarctic Macquarie Island,** *Polar biology,* Mar. 1992 11(8), p.601-606, 16 refs.

The N2-fixing biota of Macquarie I. are dominated by cyanobacteria growing epiphytically or symbiotically with plants or lichens. Highest rates of C2H2-reducing activity were found in the leafy lichen *Peltigera* sp. colonizing herbfields and short grasslands and in the coastal angiosperm *Colobanthus muscoides.* Significant rates of C2H2 reduction were also found to be associated with the liverwort *Jamesoniella colorata.* It was concluded that the common feature of plants supporting active N2 fixation in dry habitats was the dense packing of stems and leaves, enabling water translocation to the cyanobacterial zone by wick action. Epiphytic cyanobacterial C2H2 reduction in wet habitats was widespread and not restricted to any particular plant species. Notable N2-fixing lichens of the plateau were *Pseudocyphellaria delisea* and *Stereocaulon* sp. N2-fixing *Bacillus (B.macerans* or *B. polymyxa)* were universally present in coastal, grassland slope, or plateau samples, including moss polster samples. (Auth. mod.)

B-46828

Worland, R., Block, W., Rothery, P., **Survival of sub-zero temperatures by two South Georgian beetles (Coleoptera, Perimylopidae),** *Polar biology,* Mar. 1992 11(8), p.607-613, 25 refs.

The ability of adults and larvae of two species of perimylopid beetles *(Hydromedion sparsutum, Perimylops antarcticus)* to survive sub-zero temperatures was studied at Husvik, South Georgia in Oct.-Dec. 1990. Experiments determined their survival at constant sub-zero temperatures, their lower lethal temperatures and individual supercooling points. The effects of cooling rates and starvation on survival were also assessed. Mean supercooling points of field-collected individuals of both species were in the range -3.0 to -5.4 C with *Perimylops* having a deeper capacity (ca. 1.5 C) for supercooling relative to *Hydromedion.* The former species also survived freezing temperatures significantly better than the latter and its mean lower lethal temperature was 2.5 C lower. At a constant temperature of -8.5 C, the median survival times for *Perimylops* adults and larvae were 19 and 26 h respectively, whilst both stages of *Hydromedion* died within 3 h. The three cooling rates resulted in significantly different median survival temperatures for adult *Hydromedion* with 0.5 C/min producing maximum survival. Prior starvation did not have a significant influence on the survival of either species. (Auth. mod.)

B-46829

Shandikov, G.A., Faleeva, T.I., **Features of gametogenesis and sexual cycles of six notothenioid fishes from East Antarctica,** *Polar biology,* Mar. 1992 11(8), p.615-621, Refs. p.620-621.

Two peculiarities of the sexual cycles of *Trematomus* species may be noted: the uniform state of gonads of mature specimens of each species, and differences in time of spawning (austral summer and autumn for *T. centronotus* and *T. eulepidotus,* and beginning of spring, or the end of winter, for *T. scotti).* Among the features of gametogenesis of icefishes (Channichthyidae) are the early accumulation of yolk in oocytes, and the beginning of polarization and homogenization of yolk in oocytes, which are far from definitive sizes. Some differences in spawning time were registered in first maturing and repeatedly maturing specimens of *Ch. hamatus.* Repeatedly maturing specimens begin to spawn in Dec.-Jan.; those maturing for the first time still spawn in Mar.-Apr. *Ch. myersi* and *Neopagetopsis ionah,* judging by singular mature specimens, spawn during the austral autumn. (Auth. mod.)

B-46830

McClintock, J.B., Slattery, M., Heine, J., Weston, J., **Chemical defense, biochemical composition and energy content of three shallow-water antarctic gastropods,** *Polar biology,* Mar. 1992 11(8), p.623-629, Refs. p.628-629.

Aqueous extracts of the mantle tissues of the opisthobranchs *Austrodoris kerguelensis* and *Tritoniella belli* and the lamellarid gastropod *Marseniopsis mollis* were cytotoxic to the sperm of the antarctic sea urchin *Sterechinus neumayeri,* and caused behavioral responses (sustained terminal sensory tube-feet retractions) in five species of antarctic sea stars. Pieces of mantle tissue of all three species were noxious to two species of antarctic fish. Primary body components (mantle, foot, viscera) of the three gastropod species contained high levels (% dry wt) of NaOH-insoluble protein (40-59%), moderate levels of NaOH-soluble (7-25%) and lipid (6-18%), and low levels of carbohydrate (<1%). The energetic composition of the tissues reflected their organic makeup, with most energy (11-17 kJ/g dry wt) associated with protein. Total energy contents of representative adult individuals were 192, 26 and 69 kJ for *A. kerguelensis* (93 g wet wt), *T. belli* (22 g wet wt) and *M. mollis* (114 g wet wt), respectively. Although these sluggish gastropods lack an external shell and are nutrient- and energy-rich and therefore high quality prey, like many of their temperate and tropical counterparts they appear to be protected by chemicals. (Auth.)

B-46831

Laybourn-Parry, J., Marchant, H.J., ***Daphniopsis studeri* (Crustacea: Cladocera) in lakes of the Vestfold Hills, Antarctica,** *Polar biology,* Mar. 1992 11(8), p.631-635, 29 refs.

The adult sizes and reproductive capabilities of populations of the cladoceran *Daphniopsis studeri* Rühe from freshwater and slightly saline lakes in the Vestfold Hills were monitored during Dec. 1990. The population of Crooked Lake was studied in detail from July 1990-Mar. 1991. Limited samples were also obtained from Heard I. Obligate parthenogenesis involving the production of subitaneous eggs appears to be the case. No males occurred. The overwintering populations of continental Antarctica consist mainly of adult females containing extensive fat reserves. The main reproductive effort occurs in spring; some females produce a smaller second brood during the summer. Reproductive output increases with adult size which is related to the nutrient status of the lake and its productivity. The Heard I. populations have a higher weight to length ratio than the Vestfold populations and have a much greater reproductive output. (Auth.)

B-46832

Veit, R.R., Hunt, G.L., Jr., **Spatial dispersion of seabirds near the South Orkney Islands and the Weddell-Scotia Confluence,** *Polar biology,* Mar. 1992 11(8), p.637-641, 18 refs.

Five transects radiating from the South Orkney Is. were used to describe the distribution and abundance of marine birds during three days in late summer 1983. Elevated numbers of birds were found at most crossings of steep physical gradients (fronts), but species were not equally attracted to each front. The data suggest that the fronts around the South Orkney Is., especially the Weddell-Scotia Confluence, provide important foraging habitat for birds. Albatrosses and fulmars appeared to aggregate preferentially near fronts overlying the insular slope, whereas Chinstrap penguins were most abundant over the shelf. (Auth.)

B-46833
Aletsee, L., Jahnke, J., **Growth and productivity of the psychrophilic marine diatoms *Thalassiosira antarctica* Comber and *Nitzschia frigida* Grunow in batch cultures at temperatures below the freezing point of sea water,** *Polar biology,* Mar. 1992 11(8), p.643-647, 38 refs.

The diatoms *Nitzschia frigida* and *Thalassiosira antarctica* grow exponentially even at temperatures between -4 and -6 C and a salinity between 73 per mill and 100 per mill. Under these conditions the light saturation of growth is reached in continuous light at a scalar quantum irradiance of between 7 micromol/sq m/s and 10 micromol/sq m/s. The increase in salinity retards growth more than a decrease in temperature. For *N. frigida* the limit of growth is at -8 C (S=14 per mill). At increasing quantum irradiance, the chlorophyll content per unit cell volume decreases, whereas there is a significant increase in the carbon content of the exponentially growing cells. In addition, there is hardly any change in the protein content. The results show that both species of diatom can survive in ice without forming resting spores, and even grow at extremely low temperatures. (Auth.)

B-46835
Morescalchi, A., **Multiple sex-chromosome system in antarctic ice-fishes,** *Polar biology,* Mar. 1992 11(8), p.655-661, Refs. p.660-661.

The chromosomes of 11 of the 15 known species of the notothenioid family Channichthyidae, the specialized whiteblooded teleosts endemic to the southern ocean (ice-fishes) were studied. In the female sex, all studied species have the same diploid number of 48 mostly acrocentric (uniarmed) chromosomes; however, there is an interspecific variability in the chromosome morphology, type and quantity of repetitious DNA (usually seen as heterochromatin) localization of silver-stained nucleolar organizers. At least 5 of the studied species show a multiple sex-chromosome system, possibly originated by the translocation of an autosome on an earlier Y gonosome morphologically similar to the X. This peculiar sex determining mechanism, otherwise rare in teleosts, can be considered apomorphic in the same way as other morphofunctional characters usually interpreted as adaptive in these fishes. (Auth. mod.)

B-46836
Hain, S., **Maintenance and culture of living benthic molluscs from high antarctic shelf areas,** *Aquaculture and fisheries management,* Jan. 1992 23(1), p.1-11, 26 refs.

Since Oct. 1986 living benthic molluscs from the eastern Weddell Sea have been kept alive in aquaria. Special equipment and methods have been used to reduce disturbance and laboratory effects during the long-time rearing. Autecological investigations were carried out on behavior, reproduction biology and growth of several polyplacophoran, gastropod and bivalve species. (Auth.)

B-46837
Thomas, D.N., Baumann, M.E.M., Gleitz, M., **Efficiency of carbon assimilation and photoacclimation in a small unicellular *Chaetoceros* from the Weddell Sea (Antarctica): influence of temperature and irradiance,** *Journal of experimental marine biology and ecology,* May 27, 1992 157(2), p.195-209, 46 refs.

It is well established that antarctic phytoplankton and sea-ice algae are able to thrive at low temperatures, and it has been proposed that a reduction in respiration may be important in enabling them to do this. This possibility was studied in an antarctic clone of a small unicellular *Chaetoceros* species isolated from the Weddell Sea, using comparative measurements of C assimilation during long- and short-term incubation series over a range of temperatures (-1.5 to 4 C) at two irradiances (5 and 55 micromol/sq m/s). Even though doubling times varied considerably, the total amount of C assimilated per cell per generation time was similar at each of the temperature and light conditions. However, over one cell cycle, significant respiratory C losses were determined by divergences in C assimilation patterns between cumulative and long-term incubations at both light intensities at 0 and 4 C. At -1.5 C, insignificant C losses were recorded. No significant extracellular release of dissolved organic material (DOC) was observed. The photoacclimation potential of this species was also investigated over the same temperature range. Differences in photosynthetic parameters and Chl *a* concentrations between "low"- and "high"-light acclimated cells revealed a high photoacclimation capacity irrespective of incubation temperature. (Auth. mod.)

B-46838
Hayward, P.J., Ryland, J.S., **New and little-known Bryozoa from Antarctica and the southwest Atlantic,** *Bulletin du Muséum national d'histoire naturelle Section A zoologie biologie et écologie animales,* Dec. 1991 13(3-4), p.241-261, With French summary. 17 refs.

Eight species of cheilostome Bryozoa are described from Antarctica and the magellanic southwest Atlantic. Five new species are recognized, in the genera *Escharoides, Cellarinella* and *Inversiula. Cellarinella roydsi* Rogick is regarded as a junior synonym of *C. watersi* Calvet. Earlier (1904) records of *Bifaxaria denticulata* and *Bifaxaria rustica* from the Bellingshausen Sea are referred to *Cellarinella virgula* sp. nov. (Auth.)

B-46839
Warén, A., Hain, S., ***Laevipilina antarctica* and *Micropilina arntzi,* two new monoplacophorans from the Antarctic,** *Veliger,* July 1, 1992 35(3), p.165-176, 20 refs.

Two new monoplacophoran species are described from a depth of 191-742 m in the Lazarev Sea and eastern Weddell Sea. *Laevipilina antarctica* closely resembles the previously described species of *Laevipilina* McLean, 1979, and differs mainly in the convexity of the shell and in minor details of radular morphology. The stomach and the intestine of *L. antarctica* contained fine bottom sediment. The specimens range in length from 1.2 to 3.0 mm and the number of leaflets on the gills increases during ontogeny. *Micropilina arntzi* is the first live-taken species of its genus, and it is also the smallest known monoplacophoran, with a maximum shell length of 0.92 mm. It broods the young in the distal part of the oviduct and the pallial groove, and they are born at a size of 300 microns shell diameter. Both species were found on sediment bottoms with stones and shells, on which they evidently live. (Auth.)

B-46840
Öresland, V., **Feeding of the carnivorous copepod *Euchaeta antarctica* in antarctic waters,** *Marine ecology progress series,* Dec. 5, 1991 78(1), p.41-47, 22 refs.

Copepod *Euchaeta antarctica* stages V and VI were caught during 24 h sampling programs in Mar. 1989 at a coastal station in Gerlache Strait, and in Jan. 1990 at an oceanic station in the north Weddell Sea. Gut content analyses showed that copepods made up 80 to 90% of all food items by number. *Metridia gerlachei, Calanoides acutus, Euchaeta* spp., other large copepods, *Oncaea* spp., *Oithona* spp. and other small copepods were the main prey of *E. antarctica* (V, VI). Large copepods were probably more important as food than small copepods. Mean number of prey per *E. antarctica* (V, VI) was 0.9 and 1.1 at the coastal and the oceanic station, respectively. Copepodids at stage V contained more prey items than adult females at the coastal station in March. A sample from South Georgia showed that *E. antarctica* feeds during winter. *E. antarctica* individuals were not eating continuously, since in all areas over 30% of them had empty guts. The parasitic dinoflagellate *Blastodinium* sp. was found in the gut of 6.6% of *E. antarctica* at the oceanic station. This infection did not affect the number of food items found in their guts. (Auth.)

B-46841
Daly, K.L., Macaulay, M.C., **Influence of physical and biological mesoscale dynamics on the seasonal distribution and behavior of *Euphausia superba* in the antarctic marginal ice zone,** *Marine ecology progress series,* Dec. 1991 79(1-2), p.37-66, Refs. p.64-66.

Physical processes control the extent of ice cover, the magnitude and location of food, and the distribution of pack ice predators; however, physical processes do not appear to directly affect krill. Instead, the seasonal distribution and behavior of krill was interpreted to be a function of the need to acquire food and avoid predators. These 2 factors also are hypothesized to be the proximate cause of swarming during this study. Seasonal sea ice plays an integral role in the ecology of krill. Ice-edge blooms are an important and predictable food supply, particularly for reproducing adults and first-feeding larvae. Ice floes provide protection for larvae and juveniles, and sea ice biota, a widespread food source, are important to the survival of larvae during winter. In the marginal ice zone, overwintering strategies of adults included regression to an immature (sub-adult) stage, reduction of metabolic rate, and omnivorous feeding in the water column. Adults were not observed feeding on the undersurface of ice floes, probably because of increased risk of predation from pack ice predators. However, adult krill may migrate deeper into the pack ice in winter and also feed on ice biota. It is concluded that sea ice biota act as a stabilizing mechanism against extreme seasonal oscillations of food supply for overwintering krill, thus contributing to the persistence of populations of *E. superba.* (Auth.)

B-46845
Bellan-Santini, D., San Martin, G.A., **Amphipods of the Chilean antarctic expeditions in the South Shetland Is. (2. Acanthonotozomatidae)** [Amphipodes des expeditions antarctiques chiliennes dans les iles Shetlands du Sud (2. Acanthonotozomatidae)], *Verona, Museo Civico di Storia Naturale. Bollettino,* 1988 Vol.15, p.291-325, In French with Italian summary. Refs. p.323-325.

DLC QH7.V58a

The family Acanthonotozomatidae was represented in the collection of the Chilean antarctic expedition to the South Shetland Is. by 8 species belonging to 5 genera: *Echiniphimedia echinata, E. hodgsoni, Gnathiphimedia mandibularis, G. sexdentata sexdentata, Iphimedia joubini, Iphimediella margueritei, I. octodentata,* and *Pariphimedia integricauda.* The systematic status of *G. mandibularis* and *P. integricauda* is reviewed and discussed; *P. incisa* is placed in synonymy with *P. integricauda.*

B-46846
Blackburn, N., Taylor, R.H., Wilson, P.R., **Interpretation of the growth of the Adélie penguin rookery at Cape Royds, 1955-1990,** *New Zealand journal of ecology,* 1991 15(2), p.117-121, 20 refs.

DLC QH540.N43

The population dynamics of the Cape Royds rookery were modelled by computer, in order to determine the probable causes of the dramatic increase since 1980 in the numbers of Adélie penguins, *Pygoscelis adeliae,* breeding in the Ross Sea region. Variations in the extent of sea-ice around the rookery during incubation and chick rearing cannot feasibly explain the population increase, and another factor or event must be introduced which increases chick production per breeding pair and decreases adult mortality. The timing of the event is critical and rules out the cessation of human impacts or the depletion of competing baleen whales as causal factors. The event is seen as most probably the result of a recent warming of the Ross Sea climate. (Auth.)

B-46847
Smith, V.R., Steenkamp, M., **Macroinvertebrates and litter nutrient release on a subantarctic island,** *South African journal of botany,* Apr. 1992 58(2), p.105-116, 17 refs.

For most plant communities on Marion I. mineralization of the large reserves of organic matter is the main process supplying nutrients for plant growth. However, due to the constantly low temperature, soil acidity and waterlogging, rates of nutrient release mediated by microorganisms alone are too low to account for the amounts taken up by the vegetation. Microcosm studies showed that the rate of inorganic nutrient release from plant litter is generally enhanced by moth larvae, earthworms, weevil larvae and adults, snails and slugs. Overall, moth larvae and slugs exerted the greatest influence across all nutrients tested (nitrogen, phosphorus, calcium, potassium, magnesium and sodium), although the effect was most consistently significant for nitrogen and phosphorus. The influence of the other invertebrate species was mostly limited to particular animal/nutrient combinations, which were fairly consistent across litter types, e.g. earthworms for nitrogen and phosphorus, snails for calcium and weevil adults for potassium. These findings suggest that by 'short-circuiting' the slow microbially mediated mineralization of nutrients from organic matter, soil invertebrates are important agents of nutrient cycling on the island. (Auth.)

B-46852
Wang, Z.P., **Effect of environmental factors on population dynamics of *Drepanopus bispinosus* in Burton Lake, Antarctica,** *Antarctic research,* Dec. 1991 2(2), p.47-58, 23 refs.

The population dynamics of *Drepanopus bispinosus* (Calanoida: Copepoda) were studied in Burton Lake, a littoral saline lake in the Vestfold Hills, from Dec. 1983 to Jan.1985. The ecology of the lake was also studied. The *D. bispinosus* life cycle covers 20 to 21 months, and its reproductive activity lasts from the onset of winter to early summer. The winter population consists mainly of nauplii and adult males and females; the summer population consists of copepodites in stages II-V and adult females. The density of population components varies considerably through the seasons. Most nauplii appearing in winter do not develop into later stages due to adverse environmental conditions in the lake, such as low oxygen content and scarcity of food. The adult female population decreases markedly after the reproductive activities. The above data are found to be similar to those obtained in Lake Fletcher, another saline lake in the Vestfold Hills. (Auth. mod.)

B-46856
Kawamura, A., **External measurements and allometry of southern sei whale foetuses,** *Scientific reports of cetacean research,* Sep. 1990 No.1, p.21-37, 7 refs.

External measurements and allometry of a total of 89 southern sei whale foetuses 64.0-366.0 cm in length are reported. The animals were collected during the antarctic whaling season of 1967/68. This study was conducted to obtain numerical data on sei whale foetuses and some of their allometric features. The number of ventral grooves increased gradually after attaining *ca.* 100 cm long, and their numbers in the largest size groups were 57.7 (male) and 58.8 (female). The *a*- and *B*-values as determined by the allometry formula were 0.02-9.8 and 0.93-1.18, respectively. Various growth data indicated the possibility of a monophasic-like development, with significant evenness. However, due to the limited number and size coverage of the animals, it is difficult to conclude whether the southern sei whale foetus actually shows monophasic allometry. The body proportions of the sei whale foetus showed isometric characteristics similar to those observed in the adult animal. (Auth.)

B-46857
Kock, R., **Ostracods in the epipelagial zone off the Antarctic Peninsula—a contribution to the systematics and to their distribution and population structure with regard to seasonality** [Ostracoden im Epipelagial vor der Antarktischen Halbinsel—ein Beitrag zur Systematik sowie zur Verbreitung und Populationsstruktur unter Berücksichtigung der Saisonalität], *Berichte zur Polarforschung,* 1992 No.106, 209p., In German with English summary. Refs. p.193-205.

This study is based on the ostracods from quantitative RMT 1 hauls made during three antarctic *Polarstern* cruises in 1986, 1987, and 1988. The investigations were coupled to a long term study on the stocks of krill in this area, and were adapted to the vertical range of the distribution of the adult krill. The present study therefore concentrates on the upper 200 m (epipelagic zone). To complement these, some hauls were made to depths of 1000 m (mesopelagic zone). The material mainly originates from nongraded oblique hauls, and a small part from graded ones. On the basis of the results from systematics, distribution, population structure, and cited literature, a spatial and temporal model of the life cycle of *A. hettacra* and *A. belgicae* is presented. The model describes a northward drift of the older stages with Antarctic Surface Water, a subsequent spawning in the Circumpolar Deep Water, and a southward drift of younger stages together with an upward directed ontogenetic migration. According to this model, the oceanic distribution of *A. hettacra* vs. the neritic distribution of *A. belgicae* is due to the seasonally earlier and therefore longer lasting drift with the Surface Water. (Auth. mod.)

B-46869
Nicol, S., Stolp, M., Nordstrom, O., **Change in the gross biochemistry and mineral content accompanying the moult cycle in the antarctic krill *Euphausia superba*,** *Marine biology,* June 1992 113(2), p.201-209, 48 refs.

Concentrations of water, ash, protein, chitin, lipid, calcium, magnesium, sodium, potassium, strontium and copper were measured in individuals from a laboratory population of antarctic krill, *Euphausia superba* Dana, over the course of a moult cycle. Significant changes in all variables were encountered. Total ash, lipid, calcium, magnesium and strontium all increased in concentration following moulting. Water, protein and copper concentrations all decreased following ecdysis and increased again towards the end of the moult cycle. The major ions sodium and potassium fluctuated around mean levels. Cast moults of *E. superba* were shown to be a drain on the ionic load of the krill, and the losses inherent in exuviation could account for much of the variation observed during the moult cycle. (Auth.)

B-46870
Opaliński, K., **Respiratory metabolism and metabolic adaptations of antarctic krill *Euphausia superba*,** *Polskie archiwum hydrobiologii,* 1992 38(2), p.183-263, With Polish summary. Refs. p.248-263.

The mean metabolic rate of *Euphausia superba* during antarctic summers is 138 cu mm O2/g/h which is highest of all antarctic invertebrates. Factors contributing to this condition are discussed. Energy costs while moving about horizontally or vertically or during periods of hovering are fairly low, about 37% of total energy costs; the effect of weight and size, however, are decisive factors in establishing respiratory metabolism for this species. The high metabolic rate allows antarctic krill to gain relative independence from environmental conditions.

B-46871
Mayzaud, P., Razouls, S., **Degradation of gut pigment during feeding by a subantarctic copepod: importance of feeding history and digestive acclimation,** *Limnology and oceanography,* Mar. 1992 37(2), p.393-404, 24 refs.

Gut pigment degradation by females of the subantarctic copepod *Drepanopus pectinatus* was established by measurements of gut fluorescence prior to fecal pellet production. The total amount of pigment lost varied from 0 to 17% while the Chl *a* unrecovered as pheopigment ranged from 0 to 92%. A linear relationship was observed between food concentration and mean pigment loss per copepod, but not with the level of pigment loss as a percentage of total ingestion (pigment destruction efficiency) which varied without clear pattern. A nested ANOVA indicated that pigment destruction efficiency was influenced primarily by the trophic history of the animals (66% of the total variance) and to a minor extent by the experimental food concentrations (12% of the total variance). The hypothesis that gut pigment loss could be related to digestive activity and influenced by digestive acclimation processes was confirmed by the significant exponential relationship between food concentration at the time of copepod capture and the experimentally derived destruction efficiency. Careful consideration should be given to the quantitative or qualitative nature of gut pigment measurements as an *in situ* index of ingestion. (Auth.)

B-46876
Brandt, A., ***Nannoniscus bidens* Vanhöffen, 1914 from West Antarctica (Crustacea, Isopoda Nannoniscidae),** *Zoologischer Anzeiger,* June 1992 228(3/4), p.140-148, 9 refs.

Nannoniscus bidens Vanhöffen, 1914 is illustrated: a dorsal view, part of the antenna and the male pleopods 1 and 2 are presented. For taxonomic and phylogenetic comparisons a complete redescription of all appendages is given. *N. bidens* was first described by Vanhöffen from the Gauss Station in East Antarctica. It has now been sampled in the South Shetland area and the eastern Weddell Sea. (Auth.)

B-46887
Seidner, J.D., **General analysis of the east antarctic continental shelf modern radiolaria and their relationship to antarctic Circumpolar Deep Water,** Clinton, Hamilton College, 1992, 135p., B.A. thesis. 16 refs.

An analysis was made of the radiolarian assemblages in surface grab samples from the continental shelf off the George V and Adélie coasts. These samples came from a unique environment of the antarctic continental shelf water where a tongue of warm Circumpolar Deep Water (CDW) intrudes onto the shelf. It is believed that this and other warm water tongues have a substantial effect on the melting rates of antarctic ice shelves. Counts were made of the radiolarian assemblages from the samples. The counts revealed trends which relate the radiolarian percentage abundance to depth. These trends indicate that the modal abundance of some genus and families of radiolaria are depth dependent. No trend was found relating percentage abundance to distance from shore. (Auth. mod.)

B-46890
Wang, Z.P., **Feeding habit of the south polar skua around Zhongshan Station, East Antarctica,** *Antarctic research (Chinese edition),* Mar. 1992 4(1), p.1-11, In Chinese with English summary. 10 refs.

Regurgitated pellets and food remains from south polar skua in the area near Zhongshan Station were collected and examined. The results show that the skuas prey on snow petrel more often than on other small sea birds, the snow petrel being the dominant species in the local animal community. The average occurrence of snow petrel remains was very high, 67-80% of total food items. The skuas also feed on food refuse from the stations. There is a remarkable quantitative difference of prey birds in different pairs of skua. Six pairs of skua nesting at (or near) the snow petrel breeding sites exploit and defend their feeding territories. The snow petrel remains collected from those nests make up 78% of the skuas' diet. The others have no feeding territory and they forage for food in other feeding areas, including the station. (Auth.)

B-46891
Li, R.X., Yu, J.R., Lu, P.D., **Quantitative distribution of the net phytoplankton in the Great Wall Bay, Antarctica,** *Antarctic research (Chinese edition),* Mar. 1992 4(1), p.12-16, In Chinese with English summary. 6 refs.

Among the 31 species of the phytoplankton identified in the Great Wall Bay in Feb. 1985, diatoms accounted for 93% (silicoflagellate and dinoflagellate). The dominant species found are *Chaetoceros socialis, Rhizosolinia alata f. inermis, Biddulphalus striata* and *R. styliformis* var. *longispina.* The quantitative distribution of *C. socialis* decreases from the interior of the Bay toward its entrance, the reverse being true for the other 3 species. The analysis of quantitative distribution shows a greater density of pelagic species at the entrance of the Bay, which is attributed to the influx of open oceanic waters into the Bay. It is found that the interior of the Bay is controlled by coastal waters. (Auth. mod.)

B-46892
Zhang, H.S., Pan, J.M., Cheng, X.H., Xia, W.P., **Biogeochemistry research of fluoride in antarctic ocean. 2. The variation characteristics and accumulation cause of fluoride in the cuticle of antarctic krill,** *Antarctic research (Chinese edition),* Mar. 1992 4(1), p.17-22, In Chinese with English summary. 6 refs.

The source and accumulation mechanism of fluoride in krill is studied by the analysis of fluoride change in krill cuticle before and after moulting. It is concluded that, as an inorganic material, the cuticle of krill has a secondary absorption function and action on fluoride after moulting and has nothing to do with the activities of krill; the fluoride is accumulated from sea water, mainly in the form of ion exchange. (Auth. mod.)

B-46907
Potapov, M., ***Antarctophorus,* a new genus of Isotomidae (Collembola) from Antarctica,** *Revue d'écologie et de biologie du sol,* Oct. 1991 28(4), p.491-495, 3 refs.

Anurophorus subpolaris Salmon, 1962 is redescribed and a new genus *Antarctophorus* gen. nov. is set up for it. Taxonomic relations of *Anurophorus* Nicolet, *Pseudanurophorus* Stach and the new genus are discussed.

B-46909
Klingler, J.M., **Factors affecting the distribution of yeasts in the Antarctic Ross Desert,** Stillwater, Oklahoma State University, 1987, 114p., University Microfilms order No. 89-21655, Ph.D. thesis. Refs. passim.

This thesis documents the identity of yeasts recovered from samples from Mount Dido; University Valley soils (arid sites); and a glacial melt stream sediment in Taylor Valley (well-watered site), and correlates the characteristics of yeasts isolated from these sites with habitat. Distribution of yeasts in these soils appears to be limited by factors other than nutrient and water requirements. The availability of inorganic soil nitrogen sources was also determined. The results were correlated with yeast distribution. The yeasts identified from the nutrient and water-rich Taylor Valley stream sediment *(Leucosporidium antarcticum, Cryptococcus jungaricus, Vanrija foliorum,* and *Vanrija* spp.) form mycelium and/or pseudomycelium. Oligotrophic yeasts, nonfilamentous *Cryptococcus* spp., were isolated only from the more depauperate arid soils. The inability to produce filaments under nutrient-limiting conditions appears to be an adaptive survival characteristic for organisms living in the more depauperate sites. Antarctica's freezing temperatures kill yeasts which produce filamentous growth. Decreased water potential due to high cation or clay content limits distribution of yeasts in Ross Desert soils. (Auth. mod.)

B-46910
Hsiao, K.C., **Characterization of an antifreeze glycopeptide gene from the antarctic cod, *Notothenia neglecta,* and a functional study of the "pre-" sequence of this antifreeze glycopeptide,** Urbana, University of Illinois, 1990, 93p., University Microfilms order No. 91-14269, Ph.D. thesis. Refs. p.76-89.

The antarctic fish *Notothenia neglecta* synthesizes a series of 8 different-sized antifreeze glycopeptides (AFGP 1 to 8) which lower the freezing point of its body fluids below that of sea water; the sequence of one of its AFGP genes is reported. The structural gene contains 46 tandemly repeated segments, each coding for one mature peptide. Most of the repeats (44) are composed of 51 nucleotides, and encode peptides of the AFGP 8 class, but the remaining two are longer (60 nucleotides each) and code for peptides of the AFGP 7 types. Separating each repeat are 3 triplets that code for amino acid residues that are absent in the mature peptides. The expressed nucleotide sequence between the initiation codon and the first AFGP-coding segment is GT-rich and codes for a presumptive hydrophobic signal peptide of unusual sequence. This presumptive signal peptide can be partially cleaved in an *in vitro* processing system. Putative CCAAT and TATA boxes begin 102 and 92 nucleotides, respectively, upstream from the initiation codon, and the polyadenylation signal, AATAAA, is located approximately 240 nucleotides downstream from the termination codon. Thus this AFGP gene appears to encode a secreted, high-copy-number polyprotein that is processed post-translationally to produce active AFGP. (Auth.)

B-46911
McKenna, J.E., Jr., **Ecology of an exploited antarctic fish community,** Kingston, University of Rhode Island, 1990, 329p., University Microfilms order No. 91-06520, Ph.D. thesis. Refs. p.312-329.

Demersal fish represent one of the most heavily exploited resources in the antarctic ecosystem. Fish stocks around South Georgia have contributed a substantial portion of the annual catches but have declined over the past decade. The distributions and abundances of the species present in the South Georgia system were used to examine the spatial structure and temporal consistency of that antarctic fish community. The analyses of 1987-88 and 1988-89 surveys of these stocks are described. The results did not show any evidence for the recovery of the depleted stocks. Gut contents of fish collected in 1987-88 were used to describe the trophic structure and connections within the community. Three distinct trophic groups were identified: krill-eaters, piscivores, and generalists. The prevalent role of the krill resource in this community was demonstrated. However, there was little evidence for strong competition among species. The species composition of the community was tested for change by application of a Monte Carlo simulation technique. The results revealed a statistically significant shift in the community from 1986-87 to 1987-88. The trend was one of increased equitability between species abundances. (Auth. mod.)

B-46912
Veit, R.R., **Spatial dispersion patterns of antarctic seabirds,** Irvine, University of California, 1988, 190p., University Microfilms order No. 89-07801, Ph.D. thesis. Refs. p.127-136.

To establish what parts of the ocean are most attractive to foraging birds, and to determine the extent to which species co-occur in space, three sets of strip transects collected from oceanographic research vessels are analyzed. One of these sets describes the distribution of birds around their nesting colony at Bird I. at a spatial scale of kilometers to tens of kilometers. The two others were conducted at a much larger spatial scale (1000's of kilometers), one in the southwestern Atlantic Ocean, and the other in the East Wind Drift zone of the antarctic ocean. Abundances were plotted of each species observed on maps, and then the observed patterns were analyzed to detect where aggregations of birds occurred, and to determine the extent to which the distributions of species influenced one another. The data were collected over a five year period, 1982-1986. It is found that species of pelagic birds are distributed largely independently of one another at sea. That is, species do not co-occur at sea either more or less frequently than would be expected due to chance. This result held true at both spatial scales and in all three geographical areas. This finding suggests a lack of structure at the community level among assemblages of birds at sea. (Auth. mod.)

B-46914

Arnbom, T.A., Lunn, N.J., Boyd, I.L., Barton, T., **Aging live antarctic fur seals and southern elephant seals,** *Marine mammal science,* Jan. 1992 8(1), p.37-43, Refs. p.41-43.

This study describes a method for extracting post-canine or incisor teeth from live antarctic fur seals *(Arctocephalus gazella)* and southern elephant seals *(Mirounga leonina)* respectively, and their use to determine age in a field situation. Dental elevators were used to loosen the teeth from the alveolus and periodental ligament. Most teeth were removed within 1-2 min and a total of 214 and 81 teeth were collected by this method. No seal recaptured at intervals up to a year after a tooth was extracted showed signs of infection or distress related to removal of the tooth. Teeth were thin-sectioned for the purpose of aging. In both species cementum growth layer groups were a more satisfactory indicator of age than dentinal growth layer groups. Estimates of age from cementum growth layers were confirmed for antarctic fur seals using seals which had been tagged as pups up to 16 yr before sampling. (Auth.)

B-46916

Farber-Lorda, J., **Multivariate approach to the morphological and biochemical differentiation of antarctic krill *(Euphausia superba* and *Thysanoessa macrura),*** *Deep-sea research,* 1991 38(7), p.771-779, Refs. p.777-779.

The results of morphometric and biochemical measurements of samples of *Euphausia superba* and *Thysanoessa macrura* were used to study krill longevity. On each individual different measurements were taken, a differentiation index was calculated, and lipids and carotenoids analyzed; the data were processed by principal component analysis (PCA). In *E. superba* the analysis of six morphometric characteristics shows a separation into two groups for the males, but not for females. The analysis of a larger sample, using only four variables, shows an analogous, though less marked separation, suggesting a morphological evolution linked with age. When biochemical data were added, PCA shows a good separation into two groups for both males and females, and the same result was obtained using only the biochemical data and the differentiation index. No possible age groups, other than juveniles and adult males and females, could be identified by PCA for *T. macrura.* (Auth.)

B-46918

Puppione, D.L., Kuehlthau, C.M., Jandacek, R.J., Costa, D.P., **Positional analyses of triacylglycerol fatty acids in the milk fat of the antarctic fur seal *(Arctocephalus gazella),*** *Lipids,* Aug. 1992 27(8), p.637-639, 28 refs.

The positional distribution of fatty acids has been determined for the milk triacylglycerols of the fur seal *Arctocephalus gazella.* Of particular interest was the positional distribution of the polyunsaturated n-3 fatty acids in milk triacylglycerols (TG). In adipocytes of pinnipeds, TG are synthesized with the n-3 fatty acids primarily in the sn-1,3 positions. To determine the positional distribution, extracts of enzymatically digested lipids were separated by thin-layer chromatography, and the constituent fatty acids were separated and quantified by gas-liquid chromatography. Monoenoic and saturated fatty acids comprised over 75% of the total, the ratio of monoenoic to saturated fatty acids being 2:1. The percent content of the long-chain n-3 fatty acids, 20:5, 22:5 and 22:6, ranged between 15-20%. The positional analyses revealed that at the sn-2 position of milk TG, saturated fatty acids were in excess (57%), and the content of n-3 fatty acids was less than 5%. More than 80% of the n-3 fatty acids in milk were located in the sn-1,3 positions. The data indicate that in pinnipeds, TG are synthesized in the mammary gland and adipose tissue with fatty acids having similar positional distributions. (Auth.)

B-46919

Brey, T., Hain, S., **Growth, reproduction and production of *Lissarca notorcadensis* (Bivalvia: Philobryidae) in the Weddell Sea, Antarctica,** *Marine ecology progress series,* June 25, 1992 82(3), p.219-226, Refs. p.225-226.

Growth, reproduction and production of the epizoic bivalve *Lissarca notorcadensis* were compared between 2 regions of the Weddell Sea, the South Orkney and South Shetland shelves and the southeastern continental shelf. Growth lines on the shell surface were interpreted as annual growth marks. Von Bertalanffy growth functions were fitted to length-at-age data for the northern region and for the southern region. Female gonad production was estimated from the number of embryos brooded per female, embryo mass at release and the fraction of females in the population. Somatic production was calculated from weight specific growth rates. Annual somatic and gonad production/biomass *(P/B)* ratios were 0.316 and 0.151 (north), and 0.305 and 0.132 (south), respectively. These values are lower than *P/B* ratios of boreal mollusc populations of comparable mean body mass. (Auth.)

B-46920

Rau, G.H., **N-15/N-14 and C-13/C-12 in Weddell Sea birds, seals, and fish: implications for diet and trophic structure,** *Marine ecology progress series,* July 23, 1992 84(1), p.1-8, Refs. p.7-8.

Delta C-13, Delta N-15, and C/N were measured for each of 247 muscle tissue samples from 12 bird, 4 seal, and 4 fish species collected in the Weddell Sea primarily during Mar. 1986. Delta C-13 values ranged from -31.3 to -22.0 per mill and, in the case of fish and seal samples, varied inversely with C/N. This implied that lipid concentration significantly influenced these vertebrate delta C-13 measurements. No such relationship was found between C/N and delta N-15, where the latter values ranged from +4.4 to +11.2 per mill with considerable overlap among many of the taxonomic groups measured. Notable exceptions to this were found in Wilson's storm-petrel and the Kerguelen petrel, among which elevated delta N-15 values of some individuals probably reflected feeding outside of the Weddell Sea. Significant feeding on vertebrate biomass was indicated by the N-15 enrichment of the southern giant fulmar and several snow petrel individuals. Some diet separation among crabeater, antarctic fur, leopard, and Ross seals was also evident. Nevertheless, the overlap in delta N-15 among most Weddell Sea vertebrates, coupled with an observed range of vertebrate values that was considerably narrower than that of their potential prey, supports the hypothesis that many of these higher consumers share a small number of common food resources and trophic levels. (Auth.)

B-46921
Nordhausen, W., **Distribution and growth of larval and adult *Thysanoessa macrura* (Euphausiacea) in the Bransfield Strait region, Antarctica,** *Marine ecology progress series,* July 16, 1992 83(2-3), p.185-196, Refs. p.195-196.

Thysanoessa macrura was the most common euphausiid in the western Bransfield Strait region, with highest abundances of 5000 individuals per 1000 cu m in Gerlache Strait in Dec. 1986 and 4500 ind./1000 cu m in Jan. 1987, which coincided temporally and spatially with the annual spring bloom of phytoplankton. With the progression of the austral summer, high larval abundances extended into Bransfield Strait, apparently advected there by the Bransfield Current, estimated both geostrophically and with Lagrangian drifters. A discrete spawning period prior to Dec. 1986 gave rise to a distinct cohort which persisted through Mar. 1987. The study area was highly variable in phytoplankton biomass. Waters of northern Gerlache Strait reached 25 mg chl *a*/cu m in Jan. 1987, whereas Drake Passage always had <2.0 mg chl *a*/cu m from Dec. 1986 to Mar. 1987. No differences in development or growth rate were found in regions with different levels of algal biomass. The development time from calyptopis 2 to furcilia 6 was ca 90 d. Larvae of *T. macrura* did not appear to perform diel vertical migration between the 0 to 100 and 100 to 200 m depth layers. (Auth.)

B-46922
Bernhard, J.M., Bowser, S.S., **Bacterial biofilm as a trophic resource for certain benthic foraminifera,** *Marine ecology progress series,* July 16, 1992 83(2-3), p.263-272, Refs. p.271-272.

Benthic foraminifera from temperate tidal flats and shallow antarctic waters were challenged with bacterial biofilms to assess possible foraminiferal impact on attached bacterial populations. Two tectinous species *(Allogromia* sp. and *A. laticollaris)* used pseudopodial networks to rend and ingest biofilm parcels, an activity termed harvesting. The numerical density of bacteria in harvested biofilm areas was maximally depleted by ca 80% for *Allogromia* sp. and 50% for *A. laticollaris.* In contrast, the calcareous *(Cyclogyra antarctica, Elphidium incertum, Glandulina antarctica, Pyrgo williamsoni)* and agglutinated *(Astrammina rara, Astrorhiza* sp., *Crithionina* like mudball) foraminifera studied did not exhibit harvesting behavior. Time-lapse microscopy revealed that biofilm parcels were transported extracellularly toward the cell body by pseudopodia, an observation which further defines pseudopodial function in foraminiferal trophic mechanisms. Observations indicate that allogromiid foraminifera may play a previously unrecognized role in bacterial population dynamics and nutrient cycling, particularly in intertidal environments and certain deep-sea habitats where they may constitute a major meiofaunal component. (Auth.)

B-46923
Watkins, J.L., **Variation in reproductive status of antarctic krill swarms; evidence for a size-related sorting mechanism?,** *Marine ecology progress series,* June 4, 1992 82(2), p.163-174, Refs. p.173-174.

Length, sex and maturity stage of antarctic krill *Euphausia superba* Dana occurring in discrete swarms were measured. Over a 14 d period 38 swarms were sampled in a small area southwest of Elephant I. Analysis indicated that the composition of the swarms in terms of the sex ratio and maturity stage was very variable. Swarms ranged from equal mixtures of male and female krill to nearly all one sex; furthermore, krill of similar maturity frequently occurred together. The mean length of each maturity stage also varied between swarms; in some swarms the size of each maturity stage was bigger than average while in others each stage was smaller than average. The range of krill sizes in a swarm was often restricted, indicative of some type of size sorting. However, size sorting alone could not account for the observed variation in sex ratio and maturity stage, and it is likely that differential growth and active behavioral responses also contribute to the observed variation. (Auth.)

B-46930
Westermeier, R., Gómez, I., Rivera, P.J., Müller, D.G., **Distribution, abundance and necromass of marine macroalgae at King George I.** [Macroalgas marinas antárticas: distribución, abundancia y necromasa en isla Rey Jorge, Shetland del Sur, Antártica], *Santiago de Chile. Instituto Antártico Chileno. Serie científica,* 1992 No.42, p.21-34, In Spanish with English summary. 22 refs.

Data on the structure and composition of marine macroalgae on King George I. are presented, based on a study conducted between 1986 and 1989 including intertidal and subtidal zonations as well as necromass measurements. The most important algal components in the intertidal zone were the filamentous green algae *Urospora penicilliformis* (Roth) Aresch, and *Enteromorpha bulbosa* (Surh) Mont. The upper intertidal level was characterized by the presence of *Porphyra endiviifolium* (A. and E.S. Gepp) Chamb., which was restricted to the rocky crevices. Intertidal pools in the lower midlittoral zone extend the upper distributional limits of some subtidal species, in particular *Leptosomia simplex* (A. and E.S. Gepp) Kylin and *Iridaea obovata* Kutzing. In subtidal habitat, the algal assemblage was dominated by *Himantothallus grandifolius* (A. and E.S. Gepp) Moe and Silva, which account for over 80% of the total biomass; however, in studies on necromass, the incidence of this species was insignificant. Both zonational and necromass studies seem to indicate a strong relationship between the algal morphology and its degree of susceptibility to environmental perturbations, which can be generated by wave action or ice scouring. (Auth. mod.)

B-46932
Müller, D.G., Ramírez, M.E., Westermeier, R., ***Utriculidium durvillei* (Bory?) Skottsberg on King George I.** [*Utriculidium durvillei* (Bory?) Skottsberg en isla Rey Jorge, Antártica], *Santiago de Chile. Instituto Antártico Chileno. Serie científica,* 1992 No.42, p.47-52, In Spanish with English summary. 11 refs.

Utriculidium durvillei (Bory?) Skottsberg is a marine brown algae reported from subantarctic coasts. Studies on herbarium materials have showed that it is often mixed up with *Adenocystis utricularis.* This species is a very common inhabitant of subantarctic and antarctic coasts. The species are morphologically similar, and differ only by their reproductive structures: unilocular sporangia in *Adenocystis,* and plurilocular zoidocysts in *Utriculidium.* Many *Adenocystis* thalli are infected with *Myrionema,* an endophyte which forms plurilocular zoidocysts in the cortex of the host, which may also contribute to misidentification. Specimens corresponding to Skottsberg's description of *U. durvillei* were found as drift material on King George I. It is suggested that these plants are of subantarctic origin and were displaced by long range drift. (Auth.)

B-46933
Quilhot, W., **Biological role of secondary metabolites in lichens** [Posible rol biológico de metabolitos secundarios en líquenes antárticos], *Santiago de Chile. Instituto Antártico Chileno. Serie científica,* 1992 No.42, p.53-59, In Spanish with English summary. 31 refs.

Secondary products produced by lichens are assumed to play an adaptive role in species that develop their life cycles under extreme conditions. A number of hypotheses concerning their biological role —filters of ultraviolet radiation, energy transfer to the photosynthetic pigments, energy sources during starvation periods—are discussed. (Auth.)

B-46934
Espinoza, S., Matsuhiro, B., **Carbohydrates in antarctic brown algae** [Hidratos de carbono en algas pardas de la Antártica], *Santiago de Chile. Instituto Antártico Chileno. Serie científica,* 1992 No.42, p.61-68, In Spanish with English summary. 18 refs.

The brown algae *Ascoseira mirabilis, Desmarestia anceps, Desmarestia menziessii* and *Himantothallus grandifolius* of Antarctica were sequentially extracted with 80% ethyl alcohol, 2% calcium chloride, diluted hydrochloric acid and 3% sodium carbonate aqueous solutions. The ethanolic extracts from the 4 algae gave the monosaccharide D- mannitol. The neutral fractions obtained by ion-exchange chromatography of the CaCl2 extracts were found by total hydrolysis to be composed of glucose, indicating the presence of laminaran-type polysaccharides. Polysaccharides extracted with HCl proved by total hydrolysis and chromatography to contain fucose, galactose and glucuronic acid. Finally, the sodium carbonate extracts yielded alginic acid. Direct extraction of blades and haptera of the 4 species yielded alginic acid (4.8- 16.1% yield). The mannuronic to glucuronic acid ratio in the alginic acid samples varies from 0.14 to 2.9. (Auth.)

B-46935
Lazo, I., Núñez, H., Yáñez, J., **Ice-free area relationship to bird assemblages on Livingston I.** [Áreas libres de hielo y su relación con ensambles de aves nidificantes antárticas, isla Livingston, Antártica], *Santiago de Chile. Instituto Antártico Chileno. Serie científica,* 1992 No.42, p.69-75, In Spanish with English summary. 18 refs.

A detailed study of the nesting microhabitat of birds on Byers Peninsula revealed its heterogeneity, attributed to the plasticity of the ice free areas resulting from annual variations of the ice cover extent. At least 8 microhabitats used by the birds are determined, and 3 distinct features are noted: the massive use of the ice free area; an intensive use (all the nesting birds use only this area for breeding); and a sharing of the area (several microhabitats are used by more than one species). From these features it is possible to infer interactions among the populations that use common substrates which are expressed by: differences in nesting time *(Larus dominicanus* breeds about one month before *Catharacta lonnbergi);* allotopy with respect to similar but not identical substrates *(Macronectes giganteus* uses naked rock outcrops and *Sterna vittata* uses outcrops covered with lichens and mosses); and avoidance of predation by choosing sheltered sites in beds of fractured rocks *(Oceanites oceanicus* and *Fregetta tropica).* (Auth. mod.)

B-46936
Aguayo, A., Cárdenas, J.C., Torres, D., **Sightings of *Eubalaena australis* in Chilean waters, 1983-1989** [Análisis de los avistamientos de *Eubalaena australis* (Desmoulins, 1822) en aguas chilenas, desde 1983 hasta 1989], *Santiago de Chile. Instituto Antártico Chileno. Serie científica,* 1992 No.42, p.77-91, In Spanish with English summary. 22 refs.

Forty-two sightings of *Eubalaena australis* totaling 89 animals have been recorded between 1983 and 1989, including 77 adult animals, 2 juveniles and 10 calves, and indicating that the distributional area of *E. australis* in the Southeast Pacific waters has increased since 1982. The possible seasonal movements or migrations, reproductive evidence, interaction with other marine resources, and environmental disturbances promoted by man to the detriment of whales, are discussed. (Auth. mod.)

B-46937
Sato, T., **Underwater observation of antarctic fishes and invertebrates with a note on collection and transportation techniques for research and exhibition in the aquarium,** *Santiago de Chile. Instituto Antártico chileno. Serie científica,* 1992 No.42, p.95-103, 12 refs.

Underwater observation and collection of antarctic fishes and benthic invertebrates were conducted at the innermost part of Fildes Bay, King George I. Two distinct substrate types with different faunal compositions (rocky shores and clumps of submerged drifting algae) were recognized in the bay, and most animals were found associated with characteristic microhabitat of each substrate. At the shallow rocky shore, sedentary animals were found only in concave areas at the base of large rocks, where the effects of ice in winter seemed to be minimum. A wide variety of animals were found associated with clumps of submerged drifting algae on the sand/mud bottom. Successful collections of various live animals were obtained and were transported to Japan for research and exhibition in aquariums. Collection, transportation and rearing techniques of antarctic marine life are described, and the significance of submerged drifting algae as a habitat for fishes and invertebrates in the inner bay environment is discussed. (Auth. mod.)

B-46940
Atkinson, A., Ward, P., Williams, R., Poulet, S.A., **Diel vertical migration and feeding of copepods at an oceanic site near South Georgia,** *Marine biology,* Aug. 1992 113(4), p.583-593, Refs. p.592-593.

Twelve Longhurst Hardy Plankton Recorder (LHPR) profiles were taken over a 16 h period in Jan. 1990 to study feeding of 4 copepod species near South Georgia. Vertical distributions of their life stages, as well as those of dominant competitors and predators, are described in relation to the feeding cycles of *Calanoides acutus* CV, *Calanus simillimus* CV, *Calanus propinquus* CV and *Rhincalanus gigas* CIII, CV and CVI. Planktonic predators, with the exception of the diel migrant *Themisto gaudichaudii,* resided deeper than the herbivores. During the day and around midnight, when feeding rates were low, species and stages reached their maximum vertical separation. During the afternoon or evening (depending on species), all stages older than CII, as well as *Euphausia frigida* and *T. gaudichaudii,* migrated upwards, to amass in the surface mixed layer. Feeding was restricted to darkness, although *R. gigas* commenced several hours before dusk. In detail their migration and feeding differed widely, with combinations of unimodal and apparent bimodal cycles. As a whole, the results suggest that feeding could occur during sinking as well as during upward migrations; upward migrations were not always associated with feeding increases; and individuals appeared to descend after filling their guts. (Auth. mod.)

B-46941
Nigro, M., Orlando, E., Regoli, F., **Ultrastructural localization of metal binding sites in the kidney of the antarctic scallop *Adamussium colbecki*,** *Marine biology,* Aug. 1992 113(4), p.637-643, Refs. p.642-643.

The functional morphology of kidney cells and the intracellular localization of metal storage sites were studied by electron microscopy and X-ray microanalysis in the scallop *Adamussium colbecki* (Smith) collected at Gerlache Inlet in Dec. 1990. Kidney cells of *A. colbecki* show the same basic cytoarchitecture as other Pectinidae, but the nephrolithes localized in the main vacuoles show a low degree of mineralization. The sites of heavy metal storage are: the main vacuole of the renal cell, where Fe, Zn and Cu are associated with concretions; the basal membranes; and the lysosomes of amoebocytes, in which Ag, Se, Fe and Cu occur in electron-dense particles. A hypothesis for the formation and role of the Ag-Se rich particles is discussed. (Auth.)

B-46942
Williams, T.D., Rodwell, S., **Annual variation in return rate, mate and nest-site fidelity in breeding Gentoo and Macaroni Penguins,** *Condor,* Aug. 1992 94(3), p.636-645, Refs. p.644-645.

A study on the resident Gentoo *(Pygoscelis papua)* and migratory Macaroni *(Eudyptes chrysolophus)* Penguin from 1986 to 1990 at Bird I. showed the following: return rates varied significantly between years (20-79% and 35-73% in Gentoo and Macaroni penguins, respectively), lowest values in both species (in 1987) followed a severe prolonged winter and were associated with delayed onset of breeding and decreased breeding population size; decreased return rate was caused by extensive non-breeding in adult birds (25% of Gentoo and 14% of Macaroni penguins which bred in 1986 were alive but failed to breed in 1987) and increased adult mortality; male fidelity also varied between years in Gentoo penguins (0-89%) with no birds retaining the same mate in 1987; in Macaroni penguins, mate fidelity was high (71-79%) in all three years; both species showed a high degree of nest-site fidelity in all years (Gentoo, 89-100%; Macaroni 69-87%); females were more likely than males to change nest-site following mate change; intra-season pair fidelity was high in Macaroni penguins (74-78%) between breeding and the post-nuptial molt; the post-nuptial molt was also an important period for formation of new pair-bonds in this species. Despite marked differences in breeding chronology and life-history patterns in these two species, return rates, mate and site fidelity were only markedly dissimilar in one of the three years studied. (Auth. mod.)

B-46948
Dell, R.K., **Antarctic Mollusca, with special reference to the fauna of the Ross Sea,** *Royal Society of New Zealand. Bulletin,* 1990 No.27, 311p., Refs. p.285-296.

The shelled Mollusca of the Ross Sea are studied in detail in conjunction with a wide range of comparative material from other parts of the antarctic continent, the islands of the Scotia Arc and the Magellanic region. The geographical and bathymetric ranges of these species from the total area are presented. In addition, the systematics of widely distributed antarctic groups, based upon all the material available, has been studied in detail. The shelled molluscs recorded from the Ross Sea are listed, and their bathymetric ranges are discussed. On the present evidence, 13% of the species present appear to be endemic to the Ross Sea, 45% are circumantarctic in distribution, 26% show affinity with East Antarctica and 6% with West Antarctica. Some 42 species are noted as occurring only in East Antarctica and not extending to the Ross Sea. (Auth. mod.)

B-46954
Pickup, J., Rothery, P., **Water-loss and anhydrobiotic survival in nematodes of antarctic fellfields,** *Oikos,* 1991 Vol.61, p.379-388, 28 refs.

The potential to survive desiccation by entering a state of anhydrobiosis, and the conditions necessary to induce this state, were investigated in 2 species of free-living nematodes: *Teratocephalus tilbrooki* which inhabits the relatively sheltered environment of a moss cushion; and *Ditylenchus* sp. B, which lives in the more exposed aerial thalli of a lichen. *Teratocephalus* exhibits seasonal variation in the length of time it can survive anhydrobiotically. There is no evidence of increased resistance to water loss, which correlates with increased survival in this species. The ability of *Ditylenchus* to resist water loss and to survive anhydrobiotically is greater than *Teratocephalus,* with slower rates of water loss enhancing survival, and in addition altering the shape of the survivorship curve by promoting survival during the initial period of anhydrobiosis. Whilst rates of water loss increase at higher temperatures, the subsequent survival of *Ditylenchus* reaches a maximum at 10-16 C. Once this species has been dehydrated, high temperatures may be deleterious to its survival. However, once in the anhydrobiotic state, temperatures as low as -80 C can be withstood. Cuticular resistance to water loss decreases with the time for which *Ditylenchus* has been rehydrated, but no similar changes are observed in *Teratocephalus.* (Auth. mod.)

B-46958
Davey, M.C., **Seasonal periodicity of algae on antarctic fellfield soils,** *Holarctic ecology,* 1991 Vol.14, p.112-120, Refs. p.119-120.

Investigation of the seasonal changes in composition of an immature antarctic fellfield cyanobacterial/microalgal community has demonstrated a repeated periodicity. The community consisted of only 14 species. Early spring growth of filamentous chlorophytes under snow and ice was followed by summer dominance of the community by cyanobacteria, particularly *Phormidium autumnale.* Limitation of the chlorophyte populations appeared to be a result of either dehydration of the soil or increased irradiance. The population maximum of the cyanobacteria occurred in mid-summer, although there were no obvious reasons for the cessation of growth at this time, and declined rapidly in late summer. Regrowth of the community occurred from very small inocula each spring, most of the biomass having been lost during late summer or during the washout associated with the spring thaw. This regrowth demonstrates the potential for the population to establish an immature fellfield community very rapidly following exposure by glacial retreat or physical disturbance. (Auth.)

B-46959
Holloway, H.L., Nix, D.A., **Biology of disease in an antarctic avian scavenger,** *Comparative physiology and ecology,* 1991 16(3), p.94-96, 6 refs.

A south polar skua *Catharcta maccormicki* with suspicious pulmonary nodules was found to be free of fungi when histologically compared to an infected Canada goose, *Branta canadensis.* Accumulation of iron containing pigment and debris suggestive of pneumoconosis were microscopically observed. Hemosiderin was noted irregularly scattered throughout the lung. No intestinal parasites were found and, excluding the lung, no other organismic pathology was noted. (Auth.)

B-46960
Hatfield, E.M.C., **Post-recruit growth of the Patagonian squid *Loligo gahi* (d'Orbigny),** *Bulletin of marine science,* 1991 49(1-2), p.349-361, Refs. p.360-361.

Samples of *Loligo gahi* (d'Orbigny) were collected from commercial fishing vessels in the Falkland Islands Interim Conservation and Management Zone (FICZ) between Mar. and Oct. 1987, and from the R/V *Wieczno* during a survey in Aug. 1988. Samples were divided according to the two fishing seasons (Feb.-July; Aug.-Oct.) and the samples from the scientific survey were pooled with those of the second commercial fishing season. *L. gahi* were aged using putative daily growth increments within the statoliths. There was indirect evidence that growth increments in the statolith were laid down at the rate of one per day. The maximum life span of the males was a little over 1 year and was approximately 1 year in females. Back-calculation of the month of hatching reveals the presence of two spawning groups within the FICZ population which give rise to the two fishing seasons. Growth rates were calculated for both sexes from both seasons. There was considerable individual variation in growth rate in squid from both seasons, and there was more scatter in the data from first season samples taken from the commercial fishery alone. Log-linear growth models give the best fit to the data combining the fishery and scientific survey samples from the second season. (Auth. mod.)

B-46962
Parmelee, D.F., **Antarctic birds: ecological and behavioral approaches,** Minneapolis, University of Minnesota Press, 1992, 203p., Refs. p.189-195.

After a brief introduction to the geography, climate and ecology of Antarctica, the author's travels to that continent are described, including his discovery of a polar study area where he and his research team accumulated valuable information on all species of birds observed along Palmer Archipelago's many waterways and island coasts. This is followed by a comprehensive overview of ecological and behavioral features of the families of penguins, albatrosses, petrels, cormorants, waterfowl, sheathbills and other birds of Palmer Archipelago, with many tables and extensive coverage of the available literature. A General Index and a Bird Index conclude this monograph.

B-46963
Block, W., **Annotated bibliography of antarctic invertebrates (terrestrial and freshwater),** Cambridge, British Antarctic Survey, 1992, 263p.

The aims behind the bibliography are threefold: to collate information and data from the literature on antarctic terrestrial and freshwater invertebrate animals, to provide a cross-referenced, indexed information system, and to make a preliminary listing of species records. The literature survey is comprehensive, covering the period from the earliest South Polar Expedition on which invertebrates were recorded (the French "Coquille" Expedition of 1822-25) to the end of 1990, a span of 168 years. The bibliography comprises in excess of 1400 entries, most of which contain abstracts. The main bibliography itself contains the bulk of the references arranged alphabetically by author; three appendices contain material received after the completion of the main compilation, together with unpublished and unseen material. The indexes include a classification of invertebrates, taxonomic and species lists, an author index, a general subject index, a geographical or location index and a list of expeditions on which invertebrates were found.

B-46974
Bartsh, S.S., Johnston, S.D., Siniff, D.B., **Territorial behavior and breeding frequency of male Weddell seals *(Leptonychotes weddelli)* in relation to age, size, and concentrations of serum testosterone and cortisol,** *Canadian journal of zoology,* Apr. 1992 70(4), p.680-692, Refs. p.691-692.

The onset of sexual maturity and changes in weight and serum testosterone and cortisol concentrations were studied in male Weddell seals during Oct.-Dec., 1986, at a breeding colony in McMurdo Sound. Ages were estimated from length or known from tagging history. Underwater copulatory and territorial activities were monitored by colored grease transfer and radiotelemetry, respectively. Hormone concentrations were measured by radioimmunoassay. Of 37 male seals visiting the colony, 22 were resident for some 5 weeks. About one-third of the male residents defended territories into estrus and were called territorial (T). Another one-third appeared unsuccessful at defending a territory and were called transitional (TN). The remaining one-third were nonterritorial (N). Males were closely matched in size (coefficient of variation 15% for length, girth, and weight. In all males, serum testosterone and cortisol concentrations declined, approaching nadir as estrus and the breeding season ended. Concentrations of both hormones were higher in T males than in N males. Hormone profiles of TN males initially resembled those of T males, but at estrus resembled those of N males. Coincident with a change in competitive behavior was a transient rise in cortisol accompanied by a drop in testosterone. (Auth. mod.)

B-46975
Lunn, N.J., **Fostering behaviour and milk stealing in antarctic fur seals,** *Canadian journal of zoology,* Apr. 1992 70(4), p.837-839, 20 refs.

In the austral summer of 1989, 8 and 2 instances of fostering behavior and milk stealing, respectively, by antarctic fur seals at Bird I., South Georgia, were observed. The following summer, 26 cases of fostering behavior and 71 cases of milk stealing were documented. In 1990, females appeared to have difficulty acquiring sufficient resources to feed their pups, so nutritional stress was probably responsible for the increase in milk stealing. The occurrence of fostering behavior suggests that mothers were unable to recognize their own pups, although in the above cases the cause was not clear; neither human disturbance nor density appeared to be the primary factor. Maternal experience may have been a factor in 1990, as 10 of 14 females fostering pups were 5 years of age or less and had given birth to either their first or second pup. (Auth. mod.)

B-46978
Scudiero, R., **Apparent deficiency of metallothionein in the liver of the antarctic icefish *Chionodraco hamatus.* Identification and isolation of a zinc-containing protein unlike metallothionein,** *Comparative biochemistry and physiology,* Sep. 1992 103B(1), p.201-207, Ref. p.206-207.

A zinc-binding protein has been isolated and purified from the liver of the icefish *Chionodraco hamatus.* The icefish Zn-protein has characteristics distinct from those of metallothionein. The amino acid composition shows a low content of cysteine and a high content of glutamate and aspartate. No metallothionein has been detected in the extracts from icefish liver. (Auth.)

B-46979
Kopczynska, E.E., **Dominance of microflagellates over diatoms in the antarctic areas of deep vertical mixing and krill concentrations,** *Journal of plankton research,* Aug. 1992 14(8), p.1031-1054, Refs. p.1051-1054.

Phytoplankton data obtained during six summer Polish expeditions to the Antarctic Peninsula are compared with concurrently recorded data on water column stabilities and krill abundance. The results show that flagellates (1.5-20 microns) are numerically dominant over diatoms in the areas of deep vertical mixing and/or extensive krill concentrations. Of 102 stations dominated by flagellates, 85 (83.3%) are located in a well-mixed water column (>100 m) and correspond to a mean krill density of 15-346 t N/sq m. In the same areas, estimated flagellate carbon biomass exceeds diatom carbon. Of the 40 stations dominated by diatoms, 36 (90%) are located in areas of increased water column stability (upper mixed layer of 10-50 m) and correspond to a low mean krill biomass of 0.34-4.6 t N/sq m. Flagellates exceed diatoms in an unstable water column when the phytoplankton populations are low; both algal groups increase in numbers with growing stability. The results provide field evidence that deep vertical mixing and krill grazing create conditions for the dominance of flagellates over diatoms. Both factors acting together are likely to suppress diatom blooms in the Antarctic. (Auth. mod.)

B-46980
Onofri, S., Tosi, S., ***Arthrobotrys ferox* sp. nov., a springtail-capturing Hyphomycete from continental Antarctica,** *Mycotaxon,* July-Sep. 1992 44(2), p.445-451, 12 refs.

In studies of the mycoflora in Victoria Land of continental Antarctica, a species of *Arthrobotrys* which has not been described previously was discovered. This Hyphomycete, proposed here as a new species under the name of *A. ferox,* produces aerial predaceous organs consisting of ovoidal cells surrounded by an adhesive secretion and supported by a 2-celled stalk. Frequently it was observed capturing springtails belonging to the antarctic species *Gressittacantha terranova* Wise by means of these organs. (Auth.)

B-46981
Vázquez, M.J., **Santiagoside, the first asterosaponin from an antarctic starfish *(Neosmilaster georgianus),*** *Tetrahedron,* Aug. 7, 1992 48(32), p.6739-6746, 8 refs.

A new asterosaponin, named santiagoside, has been isolated from the antarctic starfish *Neosmilaster georgianus* and its structure elucidated on the basis of extensive spectroscopic experiments and chemical correlations. Santiagoside is the first asterosaponin possessing a tetrasaccharide sugar chain and a 1,4-disubstituted glucose unit. (Auth.)

B-46985

Meiselman, H.J., Castellini, M.A., Elsner, R., **Hemorheological behavior of seal blood,** *Clinical hemorheology,* 1992 Vol.12, European Conference on Clinical Hemorheology, 7th, United Kingdom, July 1991. Proceedings, Part V, p.657-675, 51 refs.

Seals place extreme demands on circulatory blood flow during dives, yet hemorheological information for these marine mammals is limited. This report contains the results of an investigation of several hematologic and rheologic parameters in three phocid seals: elephant seals (ES), ringed seals (RS) and Weddell seals (WS). Salient results included: 1) elevated hematocrit; 2) large MCV; 3) increased MCHC, with calculated RBC cytoplasmic viscosities based on MCHC being two- to four-fold higher than human; and 4) species-specific fibrinogen levels. RBC aggregation was also species specific: 1) extent of aggregation; 2) aggregate strength; and 3) ZSR. Blood viscosity data again indicated variations among species; WS blood was markedly non-Newtonian with elevated low shear viscosity, whereas RS blood exhibited much lower, nearly Newtonian viscosity. ES blood was intermediate in flow behavior. Viewed collectively, these results indicate marked rheologic "abnormalities" for seal blood which, however, are not associated with pathophysiologic findings; they thus suggest adaptive mechanisms in these animals and the potential value of aquatic mammals as model systems for clinical hemorheology studies. (Auth. mod.)

B-47002

Rubinsky, B., Arav, A., DeVries, A.L., **Cryoprotective effect of antifreeze glycopeptides from antarctic fishes,** *Cryobiology,* Feb. 20, 1992 29(1), p.69-79, 21 refs.

The authors show that the addition of fish antifreeze glycopeptides (AFGPs) to vitrifying solutions increases post-thaw viability in cultured immature pig oocytes and two-cell stage embryos of mice and pigs after rapid cooling to cryogenic temperatures. The criterion for viability is maturation to metaphase for the oocytes and the ability to develop into the four-cell stage for the pig embryo and the blastocyst stage for the mouse embryo. Without AFGPs, or with addition of antifreeze peptides (AFPs), the particular vitrifying solution and cooling/warming/culturing regime used in this study produced zero viability. In the presence of the AFGPs (40 mg/ml), survival of pig oocytes and embryos was increased to about 25%, and that of mouse embryos to 82%. Dose-response studies for the mouse embryos showed that the protective effect of AFGPs shows saturation kinetics and levels off at 20 mg/ml. The AFGPs appeared to preserve cell membrane structural integrity; however, an intact cell membrane did not always lead to viability. The absence of protective effect by AFPs suggests that protection by the AFGPs is unrelated to their common antifreeze property, i.e., inhibition of ice crystal growth, but probably results from interaction with and stabilization of the cell membranes unique to the AFGPs. (Auth. mod.)

B-47004

Karlstam, B., Johansson, B., Brynö, C., **Identification of proteolytic isozymes from antarctic krill *(Euphausia superba)* in an enzymatic debrider,** *Comparative biochemistry and physiology,* 1991 100B(4), p.817-820, 12 refs.

A partially purified krill extract (enzymatic debrider) intended for clinical use was electrophoretically characterized by polyacrylamide gel electrophoresis (PAGE) and by crossed immunoelectrophoresis (CIE) using polyclonal rabbit antibodies. Three main types of proteolytic enzymes could be separated by SDS-g-PAGE under reducing conditions. Routine CIE analysis of krill samples revealed four protease-active immunoprecipitates. Two of these precipitates were associated with the proteinase activity, one with carboxypeptidase A and one with carboxypeptidase B. Improving resolution of CIE by extending electrophoresis in the first dimension permitted separation of three serine proteinases of which two were isozymes (II and III) and the third one was unique (I). Furthermore, carboxypeptidase A could also be separated into two isozymes (AI and AII) while carboxypeptidase B still exhibited one single component. Six individual immunoprecipitates were thus identified and proved to be related to the protease activity. Highly purified enzymes were used as references in CIE and tandem-CIE to establish identification of each enzyme in the krill mixture. (Auth.)

B-47006

Greenslade, P., **Notes on the biogeography of the free-living terrestrial invertebrate fauna of Macquarie Island with an annotated checklist,** *Royal Society of Tasmania. Papers and proceedings,* Oct. 1990 124(1), p.35-50, Refs. p.43-46.

The invertebrate fauna of Macquarie I. is examined and its size, composition, endemicity and biogeographical affinities are compared with those of other subantarctic islands. Its origins, dispersal mechanisms and adaptations are discussed and the effect on it of vertebrate predators is considered. A checklist of the invertebrates known from Macquarie I. incorporating recent revisionary taxonomy is included as an appendix.

B-47008

Manzoni, M., **Antarctica as a national park** [Un parco per l'Antartide], *Sapere,* July 1991 57(6), p.9-28, In Italian. 15 refs.

An argument is made for the need to prevent the destruction of the antarctic environment, with a review of national policies within the framework of the Antarctic Treaty; an outline of the 1985-1991 Italian antarctic research program, its legal background, administration, results of scientific research, and international recognition; a discussion of the advantages, political and scientific among others, that prompted Italy to organize costly and difficult expeditions to Antarctica; a brief environmental impact assessment; and an overview of conservation steps taken over the years, including the Greenpeace proposal to protect the antarctic continent from human aggression.

B-47026

Hoshiai, T., ed, NIPR Symposium on Polar Biology, 13th, Tokyo, Dec. 5-6, 1990, **Proceedings of the NIPR Symposium on Polar Biology, No.5,** Tokyo, National Institute of Polar Research, 1992, 188p., Refs. passim. For selected papers see B-47027 through B- 47037, B-47040 through B-47042, J-47038 and J-47039.

This volume is a compilation of 16 full length papers and 8 abstracts, 16 of which are pertinent to Antarctica. The Symposium covered both marine and terrestrial polar biology; processes in the sea ice zone and inland water ecosystems were highlighted topics. The program of the Symposium and an author index conclude this volume.

B-47027

Okuyama, H., **Extremely psychrophilic microalgae isolated from the antarctic ocean,** NIPR Symposium on Polar Biology, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1992, p.1-8, 16 refs.

Two psychrophilic strains of unicellular algae were isolated from seawater samples collected in the antarctic ocean. One, strain A, was a species of *Cymbella* (Bacillariophyceae) and the other, strain B, was a species that belonged to the class Prymnesiophyceae. Optimum temperatures for growth of both algae were between 2.5 and 5 C. Upper limit temperatures for growth of strain A and strain B were between 12.5 and 15 C and between 7.5 and 10 C, respectively. It is suggested that these algae should be categorized as extremely psychrophilic algae from their significantly lower cardinal temperatures for growth. (Auth.)

B-47028

Ligowski, R., Godlewski, M., Lukowski, A., **Sea ice diatoms and ice edge planktonic diatoms at the northern limit of the Weddell Sea pack ice,** NIPR Symposium on Polar Biology, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1992, p.9-20, Refs. p.18-20.

Drifting brash ice and phytoplankton were collected between Elephant I. and the South Orkney Is. during the period from late Dec. 1988 to mid-Jan. 1989. In diatom assemblages from the sea ice, the highest occurrence was displayed by *Nitzschia curta, N. cylindrus* and *N. neglecta.* In phytoplankton assemblages the highest occurrence was shown by *N. curta, Actinocyclus actinochilus, Chaetoceros criophilum, Corethron criophilum, Thalassiothrix antarctica* and *N. cylindrus.* In the dendrogram of similarities of species composition, two groups of stations were distinguished. The first one was composed of the phytoplankton stations and the second one was composed of the sea ice stations. Microautoradiographic analysis revealed photosynthesis in diatoms from plankton and no photosynthesis in diatoms from brash ice after ice melting. Therefore, the sea ice diatoms could be regarded as an inoculum for the phytoplankton diatoms in the area studied. (Auth.)

B-47029

Men'shenina, L.L., **Distribution of Euphausiid larvae in the Weddell Gyre in Sep.-Oct. 1989,** NIPR Symposium on Polar Biology, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1992, p.44-54, Refs. p.52-54.

Distribution of Euphausiid larvae in the Weddell Gyre in late winter was examined. There were only some eggs of *Thysanoessa* near the ice margin in Sep., and the eggs and larvae (from nauplius to calyptopis I) were collected under the ice in Oct. Furcilia VI of *Euphausia superba* was found under the ice in the north of the eastern part of the Maud Rise region. A single calyptopis I of *E. frigida* was recorded over the region (in the WWCC waters) and furcilia of *Stylocherion maximum* was found in the WWCC waters in the west of the region. Furciliae IV to VI of *E. superba,* larvae (from metanauplius to furcilia I) of *Thysanoessa* and larvae (from calyptopis I to furcilia I) of *E. frigida* were abundant in the ice-free waters of the Scotia Sea in Sep. Calyptopis I of *E. triacantha* was found at the northernmost station. Spawning of *Thysanoessa* in the ice-free waters started in early Aug. and under the ice it started in late Sep. or in early Oct. *E. frigida* initiated the spawning in the ice-free waters in July, while the spawning of *E. superba* had not yet begun. (Auth.)

B-47030

Spiridonov, V.A., **Distribution and biological properties of the antarctic krill *Euphausia superba* Dana during Winter Weddell Gyre Study (WWGS) 1989,** NIPR Symposium on Polar Biology, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1992, p.55-64, Refs. p.62-64.

Samplings with Bongo net and observations on krill predators were conducted for studying distribution and biological properties of krill *Euphausia superba* in the western Weddell Gyre during the international Winter Weddell Gyre Study in Sep.-Oct. 1989 on board the ice-breaker *Akademik Fedorov.* Furciliae and postlarvae were abundant in the vicinity of the frontal zone which divides the waters of the Antarctic Circumpolar Current and the Weddell Gyre. The adult krill was obtained only in the marginal ice zone. The presence of crabeater seals indicated the occurrence of krill also in the areas west of Maud Rise where inflow of the Circumpolar Deep Water was recognized. These results confirm the hypothesis that krill is distributed over the vast periphery of the Weddell Gyre but not in the interior of the western cell of the Gyre. The youngest generation consisted of specimens just beginning to mature. They were feeding (probably on ice algae) and moulting actively. (Auth.)

B-47031

Takeuchi, I., Takeda, M., **Three species of amphipod crustaceans collected from Breid and Lützow-Holm Bays, Antarctica, during the JARE-26 Cruise,** NIPR Symposium on Polar Biology, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1992, p.65-82, Refs. p.81-82.

Three species of amphipod crustaceans are described, based on specimens collected in Breid and Lützow-Holm Bays during JARE-26: *Aeginoides gaussi* Schellenberg, 1926 and *Dodecasella elegans* K.H. Barnard, 1931 of the phtisicid Caprellidea, and *Neoxenodice hoshiaii* n.sp. of the podocerid Gammaridea. *D. elegans* seems to show a sexual dimorphism in enlargement of gills on pereonite IV in the male. *N. hoshiaii* n.sp. is closely related to *N. cryophile* Lowry, 1976 from the Ross Sea, but distinguished from *N. cryophile* by the compressed form of coxae on pereonites III to IV. (Auth.)

B-47032

Kikuchi, T., Gamô, S., ***Nebaliella brevicarinata* n.sp. from the bathyal depths off the Princess Ragnhild Coast, Antarctica (Crustacea: Leptostraca: Nebaliacea),** NIPR Symposium on Polar Biology, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1992, p.83-89, 5 refs.

Nebaliella brevicarinata sp.nov. (Leptostraca, Nebaliacea) is described on the basis of a single female, which was collected by the 27th Japanese Antarctic Research Expedition from the bathyal depths off the Princess Ragnhild Coast. The new species is easily distinguished from three known species of the genus by having a well-marked vertical short carina near the anterolateral lower angle of the carapace. (Auth.)

B-47033

Iwami, T., Takahashi, M., **Notes on some fishes associated with the antarctic krill. 3. *Anotopterus pharao* Zugmayer (family Anotopteridae),** NIPR Symposium on Polar Biology, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1992, p.90-97, Refs. p.96-97.

Morphological and ecological data are given for a total of 12 specimens of *Anotopterus pharao* Zugmayer caught along with antarctic krill. Among over 50 fish species recorded as a by-catch in krill fisheries in the antarctic ocean, *A. pharao* is known as one of the rarest species, and its ecology and biology are still obscure. Morphometric and meristic data, except for the number of vertebrae, of the present specimens mostly agree with those of fishes collected from the Northern Hemisphere; *A. pharao* from the antarctic waters has a greater number of vertebrae. The condition of hermaphroditism is histologically confirmed for the first time. All specimens histologically examined were not fully matured. Developmental stage of oocytes varies among individuals, even of nearly the same size. Stomachs were mostly vacant in 9 specimens, and those of the other 3 contained krill. One of the 3 also contained one specimen of *Notolepis coatsi* Dollo, partly digested. The distribution pattern of the antarctic *A. pharao* seems to be circumpolar. *A. pharao* is found in more than 10% of the net hauls of the krill fisheries in the Scotia Sea region. (Auth.)

B-47034
Imura, S., Higuchi, M., Kanda, H., Iwatsuki, Z., **Culture of rhizoidal tubers on an aquatic moss in the lakes near the Syowa Station area, Antarctica,** NIPR Symposium on Polar Biology, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1992, p.114-117, 10 refs.

The rhizoidal tubers of a moss collected from the bottom of lakes in the Showa Station area were cultured. Protonemata and leafy plants were developed from the tubers stored in a freezer for about two years. Antheridia and archegonia were formed in the same inflorescence at the tip of the plants. The morphological characters and the synoicous sexual condition of the plants agree closely with those of *Leptobryum pyriforme* (Hedw.) Wils. (Auth.)

B-47035
Matsumoto, G.I., **Geochemical characteristics of antarctic lakes and ponds,** NIPR Symposium on Polar Biology, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1992, p.125-145, Refs. p.142-145.

General characteristics of lakes and ponds, distributions, changes and sources of major ionic components (Na, K, Mg, Ca, Cl and SO4), nutrients and organic components in lake and pond waters and/or sediments of the McMurdo Dry Valleys and near Showa Station are discussed from a geochemical viewpoint. Chloride ion contents of lake and pond waters range from 0.17 to 251,100 mg/kg. Total salt contents show bimodal distributions, presumably reflecting the presence and absence of outflows. Generally, the relative abundances of Na, K, Ca, Mg and SO4 decrease with increasing Cl content, indicating that these ionic components deposit during concentration of dissolved salts in lakes and ponds through fractional freezing and/or evaporation of waters. Although contents of nitrate in the coastal lakes and ponds of both regions are generally low, those in the oxic zones of the inland lakes and ponds of the McMurdo Dry Valleys are often high. Nitrite concentrations in freshwater and saline lakes and ponds are generally low. Ammonium, phosphate and/or silicate released by the degradation of settled plankton are generally highly concentrated in the anoxic bottom layers of meromictic lakes because of the paucity of circulation. (Auth. mod.)

B-47036
Ohyama, Y., Morimoto, K., Mochida, Y., **Seasonal changes of nutrient concentration in Lake Ô-ike near Syowa Station, Antarctica,** NIPR Symposium on Polar Biology, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1992, p.146-150, 10 refs.

Seasonal variation of nutrients (phosphate, silicate, nitrate, nitrite and ammonium) at various depths of Lake Ô-ike near Showa Station was studied during winter of 1987 (late Mar. 1987 to mid-Jan. 1988). Although concentrations of nutrients are generally low, nitrate and ammonium increase considerably in the middle and bottom layers during the winter months. These increments may be attributed to degradation of dead planktonic and/or benthic algae. Phosphate could not be detected in the present survey, and nitrite was absent in the middle and bottom layers in the winter months. (Auth. mod.)

B-47037
Wang, Z.P., **Effect of environmental factors on population dynamics of *Drepanopus bispinosus* (Calanoida: Copepoda) in Burton Lake, Antarctica,** NIPR Symposium on Polar Biology, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1992, p.151-162, 22 refs.

The population dynamics of *Drepanopus bispinosus* (Calanoida: Copepoda) was studied from Dec. 1983 to Jan. 1985 in Burton Lake, a littoral saline lake in the Vestfold Hills. The environmental factors of the lake were observed simultaneously. *D. bispinosus* is univoltine; the population life cycle is 20- 21 months; the reproductive activities spread from winter to early summer. Adults and nauplii mainly constitute the winter population. Adult females and copepodites are absolute components of the summer population. From late summer through autumn, the population consists mainly of copepodites in stages II-V. The densities of population components present considerable variations. Most nauplii occurring in winter may not develop and transform into further stages because of restrictive conditions such as low oxygen content and food scarcity. Earlier stage copepodites appear largely in summer, when the lake is rich in oxygen and phytoplankton. Adult females decrease markedly after their reproductive activities, when the strong salinity is diluted in early summer. Such variations of densities of population compositions are closely related to changing environmental factors in the lake. (Auth.)

B-47040
Numanami, H., Okutani, T., **Archaeogastropods collected from Breid Bay and Günnerus Bank, Antarctica by Japanese antarctic research expeditions. (Extended abstract),** NIPR Symposium on Polar Biology, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1992, p.171-173, 5 refs.

A beam-trawl was towed by the icebreaker *Shirase* at 5 stations in Breid Bay (depth range 271-310 m) and Günnerus Bank (depth 280 m and 955 m) from Dec. 1984 to Feb. 1985, and Dec. 1985 to Feb. 1986. Sixteen species of 10 genera and 5 families were identified. Almost all species are smaller than 10 mm, except *Parmaphorella mawsoni, Antimargarita dulcis* and *Falsimargarita gemma*. The most diverse family in the area under study was the Trochidae, representing half the total number of species found. The most abundant species was *Margarella refulgens,* representing 24% of the total number of specimens. Twelve species occurred in Breid Bay, while only 4 species were collected from Günnerus Bank, at 280 m depth. *Leptocollonia innocens* was the only species obtained from both areas. Only a single species, *Solariella* sp., was collected from 995 m depth in Günnerus Bank.

B-47041
Akiyama, M., Hayashi, M., Ohtani, S., Kanda, H., **Some interesting problems of antarctic limnology with special reference to the allelopathic effects on the algal ecology. (Extended abstract),** NIPR Symposium on Polar Biology, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1992, p.174-176, 5 refs.

Comparison of water quality and algal growth potential of 6 small ponds (A-F) in Enderby Land is discussed. In spite of the eutrophicated condition of pond A water, the algal growth potential of this pond water was not very high compared with that of other oligotrophic ponds (B-F). In another experiment, it was demonstrated that the growth of *Chlorella* sp. in the culture medium based on the C18 treated (passed through a lipophilic column made of octadecyl silane) filtrates of pond A water was evidently better than that of non-treated control. This apparently indicates the presence of an allelopathic effect of pond A water on the growth of *Chlorella* sp. But it could not be determined that the allelochemics in pond A originated from either the contaminants of a penguin rookery or some active products of algal bloom (unidentified species) grown in the pond.

B-47042
Kanda, H., Mochida, Y., **Aquatic mosses found in lakes of the Skarvsnes region, Syowa Station area, Antarctica. (Extended abstract),** NIPR Symposium on Polar Biology, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1992, p.177-179, 9 refs.

During JARE-29 (1987-1989), aquatic mosses were found in 11 lakes of the Skarvsnes region. Most specimens were a submerged form of *B. pseudotriquetrum* but others included species of *Dicranella* in 4 lakes and *Bryum* sp. in 2 lakes. All the aquatic mosses of the region were cosmopolitan species. It is concluded that most aquatic mosses were brought to Antarctica by air currents from other regions and are not representative remnants of the pre-glacial vegetation.

B-47043

Leventer, A., **Modern distribution of diatoms in sediments from the George V Coast, Antarctica,** *Marine micropaleontology,* Aug. 1992 19(4), p.315-332, 66 refs.

In order to utilize diatom assemblages as proxies of paleoclimatic and paleoceanographic parameters, a preliminary study of the surface sediment distribution of diatoms from the George V Coast continental margin was completed. *Nitzschia curta* (Van Heurck) Hasle and *Nitzschia kerguelensis* (O'Meara) Hasle present great potential for tracking the Holocene retreat of ice across the continental shelf of this region. Concentration of *N. curta,* an "ice-related" form, decreases in an offshore direction, whereas *N. kerguelensis,* an "oceanic" species associated with circumpolar flow, displays an increase in sediments offshore. The genus *Thalassiosira* Cleve displays a clear association with areas of open water primary production, as has been noted in others parts of the Antarctic. Downcore variability in relative abundance of this genus will be useful in understanding the history of sea ice versus open water production on the George V Coast shelf. In contrast, the distribution of *Chaetoceros* Ehrenberg resting spores appears to be more complex, but may be related to the position of the stationary ice edge associated with the annual minimal extent of sea ice. Finally, an understanding of the downcore variability of *Thalassiothrix antarctica* Schimper *ex* Karsten, a species which is very abundant in the laminated sections of the sediment cores, will have to rely on studies of its distribution in other areas of the Antarctic, as it is sparsely distributed along the George V Coast today. (Auth. mod.)

B-47046

Men'shenina, L.L., Spiridonov, V.A., **Duration of the larval development of antarctic euphausiids as indicated by field data,** *Oceanology,* 1991 (Publ. Feb. 1992) 31(4), p.451-456, 24 refs.

The rate of larval development of antarctic euphausiids is measured in terms of the mean time required for passage through a single larval stage. Figures of this kind are presented for the first time for three species. The rate of development determined for *E. superba* is similar to earlier calculation results. The larvae exhibit a simple exponential rate of development with temperature. (Auth.)

B-47051

Cockrem, J.F., **Circadian rhythms of plasma melatonin in the Adélie penguin *(Pygoscelis adeliae)* in constant dim light and artificial photoperiods,** *Journal of pineal research,* 1991 11(2), p.63-69, 23 refs.

The response of plasma melatonin in Adélie penguins to constant dim light and to light/dark cycles was measured to determine the capacity of the pineal gland to secrete melatonin after exposure to continuous daylight for 2 months. Penguins were moved in midsummer from the natural photoperiod to either constant dim light (n=10), to a 12L:12D light/dark cycle (n=5), or to a 12L:12D light-/dark cycle with a 30 min light pulse (50-155 lux) on the third (n=4) or sixth (n=5) "night." Blood samples were collected regularly through cannulae for up to 33 h. The birds in dim light were sampled after 2 days, with samples obtained over at least 24 h from 7 birds. Three of these birds had melatonin rhythms (peak levels 66.7-130.2 pg/ml) whereas the other 4 birds had constant low levels (<44 pg/ml). The phase of the rhythm was similar for all 3 birds. This is consistent with the pacemaker that regulates the circadian rhythm of melatonin secretion being entrained to a period of 24 h when the penguins were exposed to the natural photoperiod. (Auth. mod.)

B-47052

Cockrem, J.F., **Plasma melatonin in the Adélie penguin *(Pygoscelis adeliae)* under continuous daylight in Antarctica,** *Journal of pineal research,* 1991 10(1), p.2-8, 31 refs.

Circadian rhythms of melatonin secretion in birds are influenced by daylength and light intensity. Daily patterns of melatonin secretion were examined in Adélie penguins under natural continuous daylight at Cape Bird. Although daylight is continuous during the antarctic summer there was a marked daily cycle of light intensity. However, there was no relationship between mean plasma melatonin levels and time of day in groups of 2-10 penguins sampled at 2-3 h intervals in Nov., Dec., or Jan. Mean melatonin levels over 24 h in groups of birds from which single samples were collected, or in groups of birds sampled repeatedly through cannulae, were low. Levels in individual birds were, however, quite variable and ranged from 5.0-68.1 pg/ml. Some birds had periods of increased melatonin levels that tended to occur during the time of day when light intensity was least. One bird had a clear low amplitude melatonin rhythm with a peak during the time of least light intensity. These results, the first for any bird under a natural photoperiod, indicate that melatonin secretion is inhibited by natural continuous daylight, but that it is not abolished. (Auth.)

B-47053

Moloney, C.L., Huntley, M.E., Lopez, M.D.G., Karl, D.M., **Carbon and the antarctic marine food web [and reply],** *Science,* July 10, 1992 257(5067), p.259-260, 15 refs.

Moloney critiques a recent paper by Huntley, et al. (q.v. B-44544), by suggesting that the antarctic food web model derived in the paper overstates by an order of magnitude the role of top antarctic predators in returning CO2 into the atmosphere. Huntley et al. rebut that argument by pointing out that the data used in the model were measured in the Antarctic and that data from temperate waters, used by Moloney, cannot be applied to polar environments.

B-47055

Gon, O., ed, Heemstra, P.C., ed, **Fishes of the southern ocean,** Grahamstown, South Africa, J.L.B. Smith Institute of Ichthyology, 1990, 462p., Bibliography p.424-453. For individual papers see A-47056, B-47059 through B-47110, E-47058 and J-47057.

DLC QL637.2 F57 1990

At a meeting of the BIOMASS Working Group on Fish Ecology in 1984, a proposal was introduced to undertake the production of a reference book that reviews current knowledge on the taxonomy, distribution and biology of southern ocean fishes. The proposal was immediately and enthusiastically endorsed by the group, and further, they agreed that the proposed book should be complementary to two other international projects already under way—the *FAO Species Identification Sheets* edited by W. Fischer and J.C. Hureau (1985), and the *Guide to the Otoliths of Southern Ocean Fishes* by T. Hecht (1987). This new book includes contributions by 32 ichthyologists from 11 countries who document 272 species belonging to 49 families.

B-47059

Eastman, J.T., **Biology and physiological ecology of notothenioid fishes,** Fishes of the southern ocean, edited by O. Gon and P.C. Heemstra, Grahamstown, South Africa, J.L.B. Smith Institute of Ichthyology, 1990, p.34-51.

DLC QL637.2 F57 1990

Notothenioids have provided a fascinating glimpse of the wide scope of adaptation and evolution at one extreme of the marine environment. During the course of their evolutionary history, notothenioids have undergone both diversification in general body form and specialization in the physiology of many body systems enabling life under antarctic conditions. Considered in this chapter are the following aspects of the biology and physiological ecology of notothenioids: (1) general biology and diversification in the six notothenioid families; (2) morphological divergence in buoyancy, with emphasis on two neutrally buoyant nototheniids, and (3) qualitative overviews of some of the physiological specializations of notothenioids, especially those related to survival at low temperature. Unlike temperate fishes, with a maximum number of species at depths less than 200 m, the species diversity of notothenioids is greatest at depths of 300-600 m. This pattern of distribution, known as glacial submergence, may be attributable to destruction of bottom habitat by continental glaciers and ice shelves. Most notothenioids are bottom fishes confined to waters less than 1,000 m deep, although the depth range of individual species may be considerable. They lack swim-bladders, are usually denser than seawater and commonly feed and reproduce on the substrate. There is no reason to suspect that the ancestral notothenioid stock lived in deep water because closely related perciform groups like blennies are coastal fishes. (Auth. mod.)

B-47060

Hureau, J.C., Slosarczyk, W., **Exploitation and conservation of antarctic fishes and recent ichthyological research in the southern ocean,** Fishes of the southern ocean, edited by O. Gon and P.C. Heemstra, Grahamstown, South Africa, J.L.B. Smith Institute of Ichthyology, 1990, p.52-63.

DLC QL637.2 F57 1990

The exploitation and conservation of antarctic fish are demarked into three time periods. From 1900 to about 1950 is the period of early fishing activities, an innocent period of learning where the fish were, how to catch them and where to market them, all on an informal, unorganized basis. Following then was an exploratory period extending from about 1950 to 1968 during which commercial interests tested the southern waters for large scale operations. Some of these were successful, notably the Soviets, and some were unsuccessful. Most of the European fishing nations and the Japanese were active in this period. The third period from the late 1960s to the present have seen great increases in the commercial tonnages harvested by several nations without much regard at first to the sustainability of the stocks. Concern for this aspect of commercial fishing surfaced during this period as more data on species populations became available; limits were set on the tonnages taken and protocols such as the CCAMLR came into force.

B-47061

Hecht, T., **Otoliths: an introduction to their morphology and use in the identification of southern ocean fishes,** Fishes of the southern ocean, edited by O. Gon and P.C. Heemstra, Grahamstown, South Africa, J.L.B. Smith Institute of Ichthyology, 1990, p.64-69.

DLC QL637.2 F57 1990

Studies on the otoliths of southern ocean fishes, apart from isolated descriptions (Hureau 1962; Yukhov 1971c; North et al. 1984), have until recently been non-existent (Hecht 1987). In view of the overall objectives of this volume on the fishes of the southern ocean, it was decided to incorporate brief descriptions of the available otolith material. Representative otoliths illustrated in this volume have been carefully chosen to depict as far as possible, a "generalized" otolith for each species. Described and discussed are the composition, structure, and function of otoliths; their value in the systematics of fossil and recent fishes; and otolith morphology and terminology. Included are schematic diagrams of the variant otolith shapes and sizes, and some of their physical features.

B-47062

Gon, O., Heemstra, P.C., **Introduction to the systematics section,** Fishes of the southern ocean, edited by O. Gon and P.C. Heemstra, Grahamstown, South Africa, J.L.B. Smith Institute of Ichthyology, 1990, p.70-76.

DLC QL637.2 F57 1990

This section of the book deals with the taxonomy of all the fish reported from the southern ocean and a small number of species which are incidental visitors or are known to occur at the borders of the CCAMLR area. In all, 49 families are identified and more than 270 species are described. The organization of the material provides for family keys, family accounts, genera, and species; line drawings accompany family keys. Species accounts comprise the bulk of the systematics section and include the valid species name, the author and date, and a vernacular name. A list of primary synonyms follows. A short description of each species is given, using a set of morphometric and/or anatomical characteristics. Where available, a representative otolith is illustrated and its structural features are described. A line drawing map is included with each species showing its distribution within or near the CCAMLR area.

B-47063

Fernholm, B., **Myxinidae: Hagfishes,** Fishes of the southern ocean, edited by O. Gon and P.C. Heemstra, Grahamstown, South Africa, J.L.B. Smith Institute of Ichthyology, 1990, p.77-78.

DLC QL637.2 F57 1990

This species has an eel-like body shape, is colored like an earthworm on the back, is yellowish underneath, and has a purplish head. It scavenges dead or dying prawns and other invertebrates. A single specimen was collected in the South Shetland Islands.

B-47064

Fernholm, B., **Petromyzontidae: Lampreys,** Fishes of the southern ocean, edited by O. Gon and P.C. Heemstra, Grahamstown, South Africa, J.L.B. Smith Institute of Ichthyology, 1990, p.79-80.

DLC QL637.2 F57 1990

Three sub-families are identified. One is confined to the Northern Hemisphere; a second to coastal regions of SE Australia, Tasmania, and the west coast of South America. The third, Geotriinae, occurs on the coasts of Australia, New Zealand, The Falkland Islands, Argentina, Chile, and at South Georgia. Some are parasitic, attaching themselves to fish and sometimes to whales.

B-47065

Compagno, L.J.V., **Sharks: Lamnidae, Mackerel sharks; Squalidae, Spiny dogfishes,** Fishes of the southern ocean, edited by O. Gon and P.C. Heemstra, Grahamstown, South Africa, J.L.B. Smith Institute of Ichthyology, 1990, p.81-85.

DLC QL637.2 F57 1990

Three shark species are known from the subantarctic regions in the Kerguelen area; one of these is doubtful. The Porbeagle, *Lamna nasus* is known from South Georgia as well. The Greenland shark *Somniosus microcephalus* is an uncommon, seasonal, but regular trawl catch on the Kerguelen Shelf at 200-300 m depth and at water temperatures of 1.8-3.0 C. It eats nearly everything it meets. *Etmopterous lucifer* is the doubtful species: being based on a single sighting in 1902, its record probably should be reexamined.

B-47066

Stehmann, M., Bürkel, D.L., **Rajidae: Skates,** Fishes of the southern ocean, edited by O. Gon and P.C. Heemstra, Grahamstown, South Africa, J.L.B. Smith Institute of Ichthyology, 1990, p.86-97.

DLC QL637.2 F57 1990

The included line drawings identify technical features and measurement methods for the skate genera. Seven species are known in antarctic and subantarctic waters, mainly in the Kerguelen Plateau, South Shetland and South Orkney Islands, and Antarctic Peninsula areas and, on one occasion each, near South Georgia and in the Ross Sea. Samples were also taken near Cape Norvegia and near Lützow-Holm Bay. Taken together, the skates seem to have a circum-antarctic distribution. Most species taken commercially are processed for fishmeal.

B-47067

Gon, O., **Halosauridae: Halosaurs,** Fishes of the southern ocean, edited by O. Gon and P.C. Heemstra, Grahamstown, South Africa, J.L.B. Smith Institute of Ichthyology, 1990, p.98-99.

DLC QL637.2 F57 1990

This benthopelagic, eel-like creature feeds mainly on crustaceans and polychaetes near the Prince Edward Islands where it forms the single antarctic representative of the family. It prefers water temperatures colder than 4 C and attains a total body length of 90 cm.

B-47068

Gon, O., **Notocanthidae: Spiny eels,** Fishes of the southern ocean, edited by O. Gon and P.C. Heemstra, Grahamstown, South Africa, J.L.B. Smith Institute of Ichthyology, 1990, p.100-101.

DLC QL637.2 F57 1990

The spiny eel ranges in all oceans, avoiding the tropical zones of both Hemispheres. In the Southern Hemisphere, distribution extends predominantly between 30-50S. One specimen was collected near the Kerguelen Islands. Only four specimens have been collected throughout the whole of the Southern Hemisphere. *Polycanthonotus challengeri* is a benthic feeder preying on small crustaceans and polychaetes. It can reach 60 cm total body length.

B-47069

Gon, O., **Synaphobranchidae: Synaphobranchiids,** Fishes of the southern ocean, edited by O. Gon and P.C. Heemstra, Grahamstown, South Africa, J.L.B. Smith Institute of Ichthyology, 1990, p.102-104.

DLC QL637.2 F57 1990

Two species having eel-like bodies make up this family in the Southern Hemisphere and they are found only in the Prince Edward Islands region of the CCAMLR area. Depth range for *Diastobranchus capensis* is 600-1400 m and for *Histiobranchus bathybius* is 644-5440 m.

B-47070

Gon, O., **Microstomatidae: Microstomatids,** Fishes of the southern ocean, edited by O. Gon and P.C. Heemstra, Grahamstown, South Africa, J.L.B. Smith Institute of Ichthyology, 1990, p.105-106.

DLC QL637.2 F57 1990

It is surmised that this species is circum-antarctic in sub-antarctic waters. Lack of records for this fish is attributed to lack of sampling, especially in the Indian Ocean sector. Of the 13 genera and 16 species known world-wide in this family, only one genus and one species occurs in the CCAMLR area. Juveniles of this group and those of the genus *Bathylagus* greatly resemble each other, which presents identification difficulties. This condition does not follow on to adulthood. The mouth structure suggests feeding on soft, small-bodied zooplankton.

B-47071

Gon, O., **Bathylagidae: Deepsea smelts,** Fishes of the southern ocean, edited by O. Gon and P.C. Heemstra, Grahamstown, South Africa, J.L.B. Smith Institute of Ichthyology, 1990, p.107-110.

DLC QL637.2 F57 1990

Three *Bathylagus* species occur in the CCAMLR area, inhabiting middle depths and bottoms of the deep sea waters. Although they have not been found in the stomach contents of antarctic animals, at least two species of seals, Elephant and Weddell, and both the Emperor and King penguins are capable of diving to the depths at which these fish may be found. The *Bathylagus* diet is 46% euphausiids; appendicularians, polychaetes, and copepods are less important in terms of weight, but were found in more stomachs than other items. All three species are well established in the South Georgia-South Sandwich area, while *B. antarcticus* is ubiquitous in the circum-antarctic region especially along the NW Antarctic Peninsula and Prydz Bay areas.

B-47072

Sazonov, IU.F., Markle, D.F., **Alepocephalidae: Slickheads,** Fishes of the southern ocean, edited by O. Gon and P.C. Heemstra, Grahamstown, South Africa, J.L.B. Smith Institute of Ichthyology, 1990, p.111-114.

DLC QL637.2 F57 1990

Four genera and species of this family of salmoniform fishes are known in the subantarctic region, being most commonly found on the Kerguelen Plateau at depths ranging from 800-2334 m. They average about 40 cm SL; biology is unknown.

B-47073

Heemstra, P.C., **Platytroctidae: Tubeshoulders,** Fishes of the southern ocean, edited by O. Gon and P.C. Heemstra, Grahamstown, South Africa, J.L.B. Smith Institute of Ichthyology, 1990, p.115.

DLC QL637.2 F57 1990

The biology and description of this species are as follows: body elongate (in southern ocean species), somewhat compressed and covered with deciduous scales. Photophores present or absent. Head naked. Dorsal and anal fins on rear half of body; no fin spines; pectoral fins small, almost rudimentary, located near ventral edge of body; pelvic fins abdominal, with 6-10 rays; no adipose fin. Luminous fluid can be discharged from a sac in the shoulder region via a short tube visible externally just below the lateral line and posterior to the shoulder girdle. This unique, flask-shaped shoulder organ is located in the body musculature medial to the cleithrum and extends from the pectoral-fin base to the dorsal end of the cleithrum. Teeth on jaws uniserial in most species; vomer with 2-4 teeth; tongue usually with teeth. Gill rakers present. Branchiostegal rays 6-9. Vertebrae 40-52. Platytroctids are moderate-sized (12 to about 30 cm SL) mesopelagic or bathypelagic fishes of the open ocean, generally found in depths of 200 to 2,000 m near continents, islands and seamounts. They are not really antarctic fishes, but the family is here included on the basis of a record of 1 species from 59S in the Atlantic Ocean sector. No commercial importance.

B-47074

Gon, O., **Gonostomatidae: Bristlemouths,** Fishes of the southern ocean, edited by O. Gon and P.C. Heemstra, Grahamstown, South Africa, J.L.B. Smith Institute of Ichthyology, 1990, p.116-122.

DLC QL637.2 F57 1990

Five species of a single genus represent this family in southern ocean waters. This small creature ranges from 3-7 cm SL and in each species the female is the larger. Distribution is circum-Antarctica, predominantly in the Indian Ocean sector south of Australia. One species has not been taken in the CCAMLR area but is known in subantarctic waters to the south of Australia.

B-47075

Gon, O., **Sternoptychidae: Hatchetfishes,** Fishes of the southern ocean, edited by O. Gon and P.C. Heemstra, Grahamstown, South Africa, J.L.B. Smith Institute of Ichthyology, 1990, p.123-126.

DLC QL637.2 F57 1990

The morphology of these fish follows: four bony pectoral-fin radials. Brachiostegal rays 6-10, of which 3 always on epihyal. Photophores arranged in distinct, well-separated groups; in some groups photophores combined to form compound light organs. Photophores present on isthmus. BR photophores 3-7. Scales present, deciduous. Small, primarily mesopelagic fishes of all but polar oceans. Some perform diel vertical migration, others partial or non-migrants. Ten genera and about 45 species, of which two members of the tribe Sternoptychini occur in subantarctic waters to 60S in the SE Pacific region, near the Falkland Islands, and the northern edge of the Drake Passage. Osteology was studied by Weitzman (1974) and development was reviewed by Ahlstrom et al. (1984). Relationships were discussed in both papers.

B-47076

Gon, O., **Stomiidae: Scaly dragonfishes,** Fishes of the southern ocean, edited by O. Gon and P.C. Heemstra, Grahamstown, South Africa, J.L.B. Smith Institute of Ichthyology, 1990, p.127-133.

DLC QL637.2 F57 1990

The morphology of these species follows: body generally elongate, but varying from relatively short and compressed to eel-like. Scales absent (except *Chauliodus* and *Stomias).* Mental barbel present (except *Malacosteus, Photostomias* and male *Idiacanthus).* True gill rakers absent in adults, but gill teeth may be present. Mouth large, jaws with fixed and/or depressible teeth of various sizes. Supramaxilla usually present (absent in *Astronesthes niger),* but may be small or extremely reduced *(Stomias, Chirustomias* and *Trigonolampa).* Palatine bones ossified (except *Malacosteus).* Palatine teeth present or absent. A single variously sized infraorbital bone present. Five hypural bones. Epipleural bones present (except *Heterophotus).* Light organs present on head and body. The five species of this family known in subantarctic waters occur just inside the northern edge of the CCAMLR area in the Indian Ocean sector.

B-47077

Post, A., **Scopelarchidae: Pearleyes,** Fishes of the southern ocean, edited by O. Gon and P.C. Heemstra, Grahamstown, South Africa, J.L.B. Smith Institute of Ichthyology, 1990, p.134-135.

DLC QL637.2 F57 1990

The morphology and description of the Pearleyes are as follows: body moderately elongate, subcylindrical to laterally compressed. Fins without spines; dorsal fin short, set about midway between edge of gill opening and anal-fin origin or farther forward, well before midlength of body, with 5-10 rays; pelvic-fin rays 9, fin origin slightly before to slightly behind dorsal-fin origin; anal-fin rays 24-39, fin origin at or behind midlength of body; pectoral fins set low on body, with 18-28 rays; principal caudal-fin rays 10+9; a dorsal adipose fin above posterior anal-fin rays. Brachiostegal rays 8. Vertebrae 46-65. Mouth terminal, gape extending well beyond vertical through middle of eye; premaxillary teeth small, fixed, in 1 row; dentary teeth in 2 rows, outer teeth small and fixed, inner teeth large, depressible canines. Two pairs of nostrils set well in front of eye. Gill rakers reduced to small, fixed gill teeth. Eyes large, tubular, directed upwards. No light organs in antarctic species. All species so far examined are synchronous hermaphrodites. Small to medium sized meso- and bathypelagic fishes up to about 350 mm SL. World-wide except in the Arctic Ocean and Mediterranean Sea. One genus in the southern ocean, but 1 other species is distinguished in the generic key as it approaches 50S.

B-47078

Krefft, G., **Notosudidae: Notosudids,** Fishes of the southern ocean, edited by O. Gon and P.C. Heemstra, Grahamstown, South Africa, J.L.B. Smith Institute of Ichthyology, 1990, p.136-137.

DLC QL637.2 F57 1990

The general description and morphology of the species follows. Small to medium-sized fishes, similar in shape to paralepidids. Body elongate, subcylindrical, increasingly compressed in the abdominal region. Head small to moderately large, tapering forward from the cheeks to a long, rather spatulate snout. Mouth large, with small conical teeth, uniserial (young) or in a narrow band (adults) on premaxilla; dentary with similar teeth in 2 well-separated bands; vomer and palatines with groups of similar teeth. Gill rakers lath-like, 1 (rarely 2) on the upper limb, 1 at angle and 13-30 on lower limb of first arch. Teeth and gill rakers are resorbed at the onset of sexual maturity. All fin rays soft; dorsal fin short, originating at about midpoint of body, with 9-14 rays; dorsal adipose fin short, above anal fin; anal fin in last quarter of body, with 16-21 rays; pectoral fins completely lateral, with 10-15 rays; pelvic fins below or in front of dorsal fin, almost always with 9 rays; caudal fin forked, with 17 principal branched rays. Vertebrae 42-67. Scales cycloid, deciduous. Lateral line single. Pseudoceanic hermaphroditic fishes, feeding predominantly on plankton. Mainly inhabitants of the warm to temperate parts of the oceans. Adults of a few species undertake far-ranging feeding migrations into subarctic and subantarctic waters. Three genera with about 16 species (Bertelsen et al. 1976). No commercial importance.

B-47079

Post, A., **Paralepididae: Barracudinas,** Fishes of the southern ocean, edited by O. Gon and P.C. Heemstra, Grahamstown, South Africa, J.L.B. Smith Institute of Ichthyology, 1990, p.138-141.

DLC QL637.2 F57 1990

The family Paralepididae includes 2 subfamilies: Lestidiinae and Paralepidinae. Only species of the latter group have been reported from CCAMLR area. Species of the subfamily Paralepidinae are distinguished in having cycloid scales on the head and the body. Body elongate and slender, subcylindrical to laterally compressed. Unpaired fins without spines; 1 short dorsal fin, 8-11 rays, pelvic-fin rays I, 8, both set behind midpoint of body; anal-fin rays 20-35, its origin distinctly behind dorsal fin; pectoral-fin rays I, 10-16, set low on body; principal caudal-fin rays 9+10; a dorsal adipose fin always present above last rays of anal fin. Brachiostegal rays 8, vertebrae 60-89. Snout pointed; mouth terminal, the lower jaw projecting, with a non-ossified process. Two nostrils. Alternating fixed and depressible fang- like teeth on lower jaw, palatines and ectopterygoid (roof of mouth); premaxillary with 3-5 fangs at tip followed by small saw- like canines. Gill rakers reduced to teeth or spines in multiple series on a bony shield. Scales cycloid and easily shed. No light organs in antarctic species. No swim-bladder. Hermaphroditic. Four genera and 9 species of medium-sized fishes, ranging from 20 cm to over 50 cm SL. Three genera and 4 species in CCAMLR area. Meso- to bathypelagic, swift swimming predators. No commercial importance. Distribution: world-wide from the Arctic to the Antarctic; most abundant in temperate waters.

B-47080

Heemstra, P.C., **Anotopteridae: Daggertooths,** Fishes of the southern ocean, edited by O. Gon and P.C. Heemstra, Grahamstown, South Africa, J.L.B. Smith Institute of Ichthyology, 1990, p.142-143.

DLC QL637.2 F57 1990

The morphology and general description of the species shows these features: body greatly elongated, compressed anteriorly (body depth just behind the head about 4 times its width), oval in cross-section posteriorly. Scales and photophores absent. Lateral line in-conspicuous or absent. Head long and compressed (interorbital width less than or equal to orbit diameter). Jaws large, more than 10% SL; a row of enormous knife-like teeth on each palatine; teeth on jaws smaller than palatine teeth. Nostrils confluent, high on snout, about an orbit diameter in front of eye. Rayed dorsal fin absent; adipose dorsal fin well developed. Anal fin far back, under the adipose fin and near the caudal fin. Pelvic fins slightly behind middle of SL. No fin spines. Caudal fin forked, the lobes about equal. Vertebrae 78-83; epipleural and pleural ribs well-developed; intermuscular bones numerous and greatly elongated. Swim-bladder absent; skeleton poorly ossified. Gills 4; no gill rakers or teeth on gill arches; pseudobranch well developed. Branchiostegal rays 7, the membranes separate and not joined to isthmus. A single genus and species, taken from the Scotia Sea, Weddell Sea, and off Coats Land, establishes this family as an antarctic denizen.

B-47081

Gon, O., **Alepisauridae: Lancetfishes,** Fishes of the southern ocean, edited by O. Gon and P.C. Heemstra, Grahamstown, South Africa, J.L.B. Smith Institute of Ichthyology, 1990, p.144-145.

DLC QL637.2 F57 1990

The physical appearance of the species is as follows: body elongate, almost eel-like, and slightly compressed. Dorsal fin long, extending along most of body length, and very high. Adipose fin present. Anal fin low and shortbased, situated below end of dorsal fin. Pelvic fins abdominal. Pectoral fins inserted low on ventral part of body. Caudal fin forked and relatively large. Swim-bladder and scales absent. Mouth large with numerous small teeth and some large, sharp fang-like teeth. A low fleshy lateral keel present along posterior half of body. A single genus of pelagic carnivores found in all oceans, down to about 1,000 m. One species in the CCAMLR area, reported from all subantarctic islands in the Indian Ocean sector and from Macquarie I.

B-47082

Hulley, P.A., **Family Myctophidae: Lanternfishes,** Fishes of the southern ocean, edited by O. Gon and P.C. Heemstra, Grahamstown, South Africa, J.L.B. Smith Institute of Ichthyology, 1990, p.146-178.

DLC QL637.2 F57 1990

Thirty-five species of this family are found in the CCAMLR area in a circum-Antarctica distribution with variable frequencies of occurrence. They have compressed heads and bodies and large lateral eyes; jaw teeth are numerous, small, and closely set in bands; all fins lack spines; photophores are arranged in distinct groups on the head and trunk, and some species bear luminous patches or scales at the bases of fins or other body parts. They are small fish, averaging 7.4 cm SL with a range of 3.0 to 15.0 cm SL. Eleven species have not as yet been taken in the CCAMLR area but their occurrence in the northern region of the Indian Ocean sector is anticipated because they are bitemperate or south temperate pattern species.

B-47083

Chiu, T.S., Markle, D.F., **Muraenolepididae: Eel cods,** Fishes of the southern ocean, edited by O. Gon and P.C. Heemstra, Grahamstown, South Africa, J.L.B. Smith Institute of Ichthyology, 1990, p.179-182.

DLC QL637.2 F57 1990

Body elongate. Two dorsal fins, the first with 2 rays (1 reduced); second dorsal, caudal, and anal fins confluent; pelvic fins jugular, with 5 rays, the outer rays filamentous; no fin spines. Mouth terminal; chin barbel present; jaws with villiform teeth; head of vomer toothless. Gill openings restricted below pectoral fins. Lateral line only on anterior part of body. Scales oblong and embedded in skin. Benthopelagic fishes found only in the Antarctic and subantarctic; distributed from continental shelf to outer slope. One genus with 4 species. Andriashev (1965) considers this family as typically antarctic, but DeWitt (1971) suggests that they may have invaded the southern ocean recently. Both reproductive and feeding biology are unknown. The present work is based on specimens from LACM *Eltanin* collections and the types of *Muraenolepis microps.* No commercial utilization is known at present.

B-47084

Chiu, T.S., Markle, D.F., Meléndez, R., **Moridae: Deepsea cods,** Fishes of the southern ocean, edited by O. Gon and P.C. Heemstra, Grahamstown, South Africa, J.L.B. Smith Institute of Ichthyology, 1990, p.183-187.

DLC QL637.2 F57 1990

Body fusiform to elongate with a narrow caudal peduncle. One or 2 dorsal fins, rarely 3, sometimes deeply notched; caudal fin separate, truncate or emarginate; pelvic fins jugular in adult with 1 to many rays, the outer ones may or may not be elongate, juveniles may have numerous rays; no fin spines. Mouth terminal or subterminal, chin barbel usually present; vomer toothless or with minute teeth. Eye size moderate. Scales cycloid. Swim-bladder connected to auditory capsules. Small to medium size (reaching 70 cm), benthopelagic fishes distributed world-wide; ranging from outer continental shelf to the lower slope. Several species caught commercially in New Zealand and Australia. Seventeen genera and about 71 species around the world; 4 species in CCAMLR area. Additional species likely to be discovered. Distribution in the Atlantic Ocean extends from the Davis Strait to South Georgia; in the Antarctic, off South Georgia and South Sandwich Is., and around the Prince Edward and Kerguelen Is.

B-47085

Chiu, T.S., Markle, D.F., **Melanonidae: Melanonids,** Fishes of the southern ocean, edited by O. Gon and P.C. Heemstra, Grahamstown, South Africa, J.L.B. Smith Institute of Ichthyology, 1990, p.188-189.

DLC QL637.2 F57 1990

Head and body compressed, terminating in a long tapering tail. One continuous dorsal fin (some authors mistakenly identifying 2); 1 long anal fin; caudal peduncle narrow and caudal fin small with numerous procurrent rays; pectoral fins midlateral; pelvic fins below pectorals; no fin spines. Head with numerous small soft ridges; chin barbel absent. Eye size moderate. Outer gill-rakers of first gill arch strong and long. Scales small and cycloid. Swim-bladder with no otophysic connection. Meso- to bathypelagic fishes found worldwide, but nowhere common. One genus with 2 species of which 1 occurs in the CCAMLR area. The species is known in Antarctica only from the holotype and a recent capture in Prydz Bay. Two other records shown on the accompanying map are specimens collected by the *Eltanin.* Reported from 600 to 3500 m depth.

B-47086

Chiu, T.S., Markle, D.F., **Gadidae: Cods,** Fishes of the southern ocean, edited by O. Gon and P.C. Heemstra, Grahamstown, South Africa, J.L.B. Smith Institute of Ichthyology, 1990, p.190-191.

DLC QL637.2 F57 1990

Body subfusiform. Three dorsal fins and 2 anal fins; no fin spines. Pelvic fins small, thoracic; caudal fin truncate to slightly forked. Chin barbel absent in southern ocean representative. Swim-bladder with short, horn-like processes anteriorly, not in contact with auditory capsules. Based on work by Markle (1989) the family is here restricted to the subfamily Gadinae of Nelson (1984) with 12 genera and about 25 species around the world. Demersal, benthopelagic or pelagic on continental shelves and upper slope regions. Extremely fecund fishes, producing moderate size (1-2 mm) pelagic eggs without oil globules. Omnivorous and voracious in feeding habits. Mostly confined to north temperate and Arctic habitats; the basis of major fisheries in the North Atlantic and North Pacific.

The antarctic representative of this species has been found in subantarctic habitats in the Scotia Sea, South Orkney and South Shetland Is; in summer it is abundant in the last two named areas.

B-47087
Iwamoto, T., **Macrouridae: Grenadiers,** Fishes of the southern ocean, edited by O. Gon and P.C. Heemstra, Grahamstown, South Africa, J.L.B. Smith Institute of Ichthyology, 1990, p.192-206.
DLC QL637.2 F57 1990

The morphology and distribution of this family follows. Body short, tail long and tapered, lacking a caudal fin. Head large, often cavernous with enlarged sensory canals. Snout often pointed. Two separate dorsal fins (except 1 in Macrouroidinae), the first short and high with a rudimentary splint adjoined to a long spinous ray; second dorsal fin long, low (much reduced in most Macrourinae), confluent with anal fin; pectoral fins well developed; pelvic fins thoracic to almost jugular, absent (1 genus), small, or well developed. Abdominal vertebrae 10-16. Mouth small to large, inferior to terminal; jaws bearing small to large conical teeth; palate toothless. Chin barbel usually present. Outer gill slit restricted in all antarctic members; branchiostegal membranes with 6-8 rays, forming a narrow to broad fold across isthmus; gill rakers usually tubercular, but lathlike in some species (outer series of first arch absent in 2 genera). Swim-bladder usually well developed, with drumming muscles in males of many species. Scales cycloid but covered with spinules in most species. A ventral light organ in many species. About 35 genera and 300 species of small to medium-sized (150 cm) exclusively deep- sea fishes, most of which are benthopelagic, but a few are bathypelagic, including 1 endemic southern ocean species. Family world-wide in all oceans, but species most numerous in tropical seas; some species extremely wide ranging, others confined to limited areas. Four of the 9 southern ocean species apparently endemic to the CCAMLR area.

B-47088
Nielsen, J.G., **Ophidiidae: Cuskeels,** Fishes of the southern ocean, edited by O. Gon and P.C. Heemstra, Grahamstown, South Africa, J.L.B. Smith Institute of Ichthyology, 1990, p.207.
DLC QL637.2 F57 1990

Morphology and distribution of this species are given below. Body more or less elongate. Dorsal and anal fins long-based, joined to caudal fin. Ventral fins absent or with 1-2 slender rays. Scales small and cycloid. Developed gill rakers on first arch 3 or more. All ophidiids are oviparous. Predominantly found in the tropical area and in the deep sea. About 40 genera with 135 species and still many to be described. The genera have been reviewed by Cohen & Nielsen (1978). Sizes range from about 15 cm in some shallow water forms to more than a meter in certain deep sea species. One genus represented in the southern ocean. Only known from the type locality in the Weddell Abyssal Plain. The holotype was collected at 4,500 m.

B-47089
Meléndez, R., Markle, D.F., **Carapidae: Pearlfishes,** Fishes of the southern ocean, edited by O. Gon and P.C. Heemstra, Grahamstown, South Africa, J.L.B. Smith Institute of Ichthyology, 1990, p.208-209.
DLC QL637.2 F57 1990

Following is the morphology and distribution of the subantarctic pearlfish. Naked eel-like fishes with slender body tapering to a long tail. Mouth large, with small teeth and sometimes with large fang-like teeth. Gill membrane free from isthmus. Supramaxillary absent. Pectoral fin usually present, may be reduced or even absent (in some *Encheliophis)*. Pelvic fins usually absent (present in *Pyramodon)*. Life history complex, with a very specialized pelagic larval stage, the vexillifer, which has a long and variously ornamented first dorsal- fin ray. The pearlfishes are distributed world-wide, principally in tropical waters, from shallow to upper continental slope depths. Some species are free-living *(Echiodon)* and others live inside invertebrate hosts like sea cucumbers, starfishes, and molluscs. There are 7 genera and 31 species including 1 unnamed form. One genus and 1 species in the CCAMLR area. It should be noted that 3 additional rare species of *Echiodon* occur off New Zealand and might be encountered in the CCAMLR area. In the Southern Hemisphere, pearlfishes have been found in Falkland I. waters and the eastern slope off South Georgia.

B-47090
Pietsch, T.W., **Caratiidae: Seadevils,** Fishes of the southern ocean, edited by O. Gon and P.C. Heemstra, Grahamstown, South Africa, J.L.B. Smith Institute of Ichthyology, 1990, p.210-211.
DLC QL637.2 F57 1990

The morphology of this species is presented, discriminated sexually. Metamorphosed females with elongate body; head length approximately 40% SL; greatest body depth about 50% SL. Mouth large, vertical to strongly oblique, not extending past eye; jaw teeth slender, recurved, and depressible, those in lower jaw considerably larger and slightly more numerous than those in upper. Eye small, subcutaneous. Gill opening oval, situated posterior to pectoral fin base. Two or 3 caruncles (modified dorsal rays, each bearing a bioluminescent gland) on dorsal midline of trunk just anterior to dorsal fin. Illicium (fishing apparatus) exposed, emerging on head from between frontal bones just posterior to eye, posterior end protruding on dorsal midline of trunk just anterior to caruncles; escal bulb (bait) oval, with or without 1 or 2 distal appendages. Skin everywhere covered with close-set dermal spines. Swim-bladder absent. Free-living adolescent males with a pair of large denticular teeth on snout, fused at base and articulating with pterygiophore of illicium. Two pairs of denticular teeth on tip of lower jaw; premaxillae degenerate; jaw teeth absent. Eyes large, bowl-shaped, directed laterally, and pupil much larger than lens. Olfactory organs minute. Caruncles absent. Skin naked. Swim-bladder absent. Adult males parasitic. Skin spinulose. Denticles, eyes, and gut degenerate. With two minor exceptions, all known material of this species has been collected from the southern ocean between 35 and 68S.

B-47091
Pietsch, T.W., **Oneirodidae: Dreamers,** Fishes of the southern ocean, edited by O. Gon and P.C. Heemstra, Grahamstown, South Africa, J.L.B. Smith Institute of Ichthyology, 1990, p.212-213.
DLC QL637.2 F57 1990

The family comprises 15 genera and 54 species. Females of some genera attain a standard length of 213 mm; the largest known metamorphosed male measures 16.5 mm SL. Nearly cosmopolitan in distribution; may be collected at depths ranging from approximately 300-3,000 m, but most commonly taken between about 800 and 1,500 m. Genus *Oneirodes* Lüken, 1871. Morphology: mouth large, cleft extending past eye. Frontal bones convex along entire dorsolateral margin. Vomerine teeth present. Illicium length greater than 13% SL. Sphenotic spine well developed. Articular spine present; quadrate spine larger than mandibular spine; angular spine present. Pharyngobranchial of first arch present. Pectoral lobe short and broad, shorter than longest pectoral-fin rays. Posterior margin of opercle deeply notched; subopercle short and broad; upper portion rounded to bluntly pointed, lower portion semicircular, without anterior spine. Coracoid with a posteroventral process. Skin covered with minute, scattered dermal spines; pigmented skin not extending past base of caudal fin. Of 31 recognized species, only 1 is known from the southern ocean.

B-47092

Pietsch, T.W., **Melanocetidae: Devil-anglers,** Fishes of the southern ocean, edited by O. Gon and P.C. Heemstra, Grahamstown, South Africa, J.L.B. Smith Institute of Ichthyology, 1990, p.214.

DLC QL637.2 F57 1990

Morphology: metamorphosed females with body relatively short and deep, globose; greatest body depth 50-80% SL. Mouth large, cleft oblique to almost vertical, not extending past eye; jaw teeth slender, recurved, and depressible, some slightly hooked distally, those in lower jaw less numerous, but slightly longer, than those in upper jaw. Eye small, subcutaneous. Gill opening oval in shape, situated posterior to pectoral lobe. Caruncles absent. Illicium exposed, emerging on head from between eyes; escal bulb simple, usually with a rounded or conical distal prolongation, and often with posterior and anterior crests; elongate escal appendages and filaments absent. Minute widely spaced skin spines present in some species. Swim-bladder absent. Males free-living. Upper denticular bone with 2-3 semicircular series of strong, recurved denticles, fused with a median series of 3-9 enlarged dermal spines that articulate with illicial pterygiophore; lower denticular with 10-23 recurved denticles, fused into a median and 2 lateral groups; jaw teeth absent. Eyes elliptical, directed laterally, diameter of pupil larger than that of lens. Olfactory organs large, nostrils lateral, nasal area unpigmented, inflated. Caruncles absent. Skin spinulose or naked. Swim-bladder absent. Dorsal-fin rays I+13-17; anal-fin rays 3-5; pectoral-fin rays 15-23; pelvic fin absent; caudal-fin rays 9; branchiostegal rays 6.

B-47093

Gon, O., **Lampridae: Opahs,** Fishes of the southern ocean, edited by O. Gon and P.C. Heemstra, Grahamstown, South Africa, J.L.B. Smith Institute of Ichthyology, 1990, p.215-217.

DLC QL637.2 F57 1990

Body oval and compressed. Head large, with a blunt snout and a moderate eye. Nostrils small, contiguous and closer to upper jaw than to eye. Mouth small, with a unique arrangement of protrusible maxillae; teeth present in juveniles but absent in adults. No true spines in fins. Dorsal-fin origin above or slightly behind posterior end of pectoral-fin base. Anterior dorsal-fin rays elongate. Pectoral-fin base horizontal and inserted on upper third of body. Pelvic fins thoracic to abdominal, reaching posteriorly beyond anal-fin origin. Anal-fin base shorter than dorsal-fin base. Caudal fin forked. Body covered with small, cycloid and deciduous scales. Lateral line arched anterior to and level with pelvic-fin insertion, but straightening posteriorly. Swim-bladder large, physoclistic. Branchiostegal rays 6. Vertebrae 43-46. A single genus *Lampris* Retzius, 1799, with circumglobal distribution except for polar seas. Two species, both in the CCAMLR area. Rare fishes usually found in the lower epipelagic zone. Specialized pelagic larvae. Embryonic development probably precocious.

B-47094

Gon, O., **Melamphaidae: Bigscale fishes,** Fishes of the southern ocean, edited by O. Gon and P.C. Heemstra, Grahamstown, South Africa, J.L.B. Smith Institute of Ichthyology, 1990, p.218-221.

DLC QL637.2 F57 1990

Beryciform fishes with compressed and oblong to elongate body, somewhat robust in appearance, and a relatively long and slender caudal peduncle. Head large, cavernous and weakly ossified. Frontal bones with thin, delicate ridges. Snout short and blunt. A medial internarial spine or ridge in front of eyes, sometimes poorly developed. Circumorbital bones enlarged. Eyes moderate to small. Opercular bones vary from smooth to serrate. Supramaxilla present. A single continuous dorsal fin with 1-3 weak, slender spines. A single anal-fin spine. Pelvic fin with 1 spine and 6-8 rays. Caudal-fin base with 3-4 dorsal and ventral procurrent spines. Head sensory canals well developed, covered by thin epidermis with sensory structures in the form of embossed lines. Scales thin, cycloid, moderate to large and usually deciduous. Opercle and cheek scaled. Lateral line reduced to at most 2 pored scales. Teeth villiform, in single to polyserial bands in both jaws. Palate toothless. Pseudobranch varies from poorly tc well developed. Branchiostegal rays 7-8. Pyloric caeca 5-8. Vertebrae 24-31 including terminal vertebral element. Five genera and 33 species of small, rare meso- and bathypelagic fishes with no commercial value. Melamphaid fishes occur in all oceans except the Arctic Ocean and Mediterranean Sea. Lateral scale series counted from rear end of postemporal bone to caudal-fin base. Pectoral-fin ray count includes uppermost rudimentary ray. Species diagnoses are based on southern ocean specimens.

B-47095

Paxton, J.R., Gon, O., **Cetomimidae: Whalefishes,** Fishes of the southern ocean, edited by O. Gon and P.C. Heemstra, Grahamstown, South Africa, J.L.B. Smith Institute of Ichthyology, 1990, p.222-225.

DLC QL637.2 F57 1990

Body soft and flabby, elongate and compressed, whale-like in shape. Head large. Eyes small to rudimentary, closer to upper jaw than to dorsal profile of body. Mouth enormous, maxilla reaching far beyond eye; teeth small. Pelvic fins, fin spines and abdominal ribs absent. Stomach and abdomen greatly distensible. Dorsal and anal fins placed opposite each other on posterior half of body. Pectoral fins small, in a ventrolateral position. Body and head scaleless, but large lateral-line scales embedded in lateral-line canal. Lateralis sensory system usually cavernous on head and body, with large pores, rarely of papillate neuromasts. Swim-bladder and pyloric caeca absent. Gill openings large, gill membranes free from isthmus. Gill rakers club-shaped or reduced to bony plates covered with minute teeth. Photophores absent. Cavernous tissue usually present around anus, sometimes also along dorsal- and anal-fin bases. Rare meso- and bathypelagic fishes found in all oceans. Nine genera and about 35 species (Paxton 1989). Two genera and 3 species in the CCAMLR area. The small number of antarctic cetomimids (15 specimens of 3 species) and their complete absence from the Indian Ocean sector is at least partially attributable to the paucity of midwater trawls taken below 1,500 m in the southern ocean. The first step in studying this second largest of bathypelagic families is to undertake a midwater sampling program in deep water, particularly in the Indian Ocean sector. With 2 of the 3 antarctic species known only from 2 specimens each, the most basic studies on reproduction, feeding and migration require more study material.

B-47096

Heemstra, P.C., **Oreosomatidae: Oreos,** Fishes of the southern ocean, edited by O. Gon and P.C. Heemstra, Grahamstown, South Africa, J.L.B. Smith Institute of Ichthyology, 1990, p.226-228.

DLC QL637.2 F57 1990

Body deep and compressed. Head broad, interorbital area flat. Eyes huge, their diameter greater than snout length. Jaws with 1 or 2 rows of tiny teeth; upper jaw protrusile. Fin spines longitudinally grooved; dorsal, anal and pectoral fin rays unbranched. Gills three and a half (no slit behind last hemibranch). The pelagic prejuvenile stage is quite different in shape from the adult, and has large bony excrescences or warty protuberances on the flanks and lower part of the enlarged belly. Oreos occur in temperate waters of all oceans, but they are more common in the Southern Hemisphere and of commercial importance off New Zealand. Adults are benthopelagic on the continental slope in depths of 200 to 1,500 m, and they are also found in similar depths at seamounts and oceanic islands. Four genera with 10 species, of which 2 are undescribed. One species is known from antarctic waters. The round oreo is known in the Southern Hemisphere from off Argentina, Namibia and west coast of South Africa, off southern Chile and northeast of the Falklands, New Zealand, Australia, the Kerguelen Is., and Antarctica.

B-47097

Heemstra, P.C., Duhamel, G., **Congiopodidae: Horsefishes,** Fishes of the southern ocean, edited by O. Gon and P.C. Heemstra, Grahamstown, South Africa, J.L.B. Smith Institute of Ichthyology, 1990, p.229-230.

DLC QL637.2 F57 1990

Body oblong, compressed, smooth or covered with small embedded spiny scales. Snout produced; mouth small, protrusile; a single nostril on each side of snout. Gill opening restricted to a slit above pectoral-fin base. Dorsal fin spines strong, the longest subequal to body depth; pelvic fins with 1 spine and 5 unbranched rays. About 10 species arranged in 4 genera; restricted to cool waters of the Southern Hemisphere. One species represented at subantarctic islands and some oceanic seamounts of the Indian and Pacific sectors of the southern ocean.

B-47098

Stein, D.L., Andriashev, A.P., **Liparididae: Snailfishes,** Fishes of the southern ocean, edited by O. Gon and P.C. Heemstra, Grahamstown, South Africa, J.L.B. Smith Institute of Ichthyology, 1990, p.231-255.

DLC QL637.2 F57 1990

Body tear-drop shaped, flattened to various degrees depending on species. Dorsal and anal fins single, continuous, joined to caudal fin; no fin spines; all fin rays unbranched. Pectoral fins often deeply divided, lower lobe easily mistaken for pelvic fin; pectoral-fin notch formed by shorter rays in mid-fin; rudimentary (unsegmented) rays occasionally present, difficult to determine. Pelvic fins (if present) forming ventral sucking disc. Vertebrae about 40-80. Nostril single or double. Mouth relatively small to large; teeth usually present, rarely absent, trilobed to simple, blunt or sharp, small or large, uniserial or in multiple rows often forming broad bands. Gill opening completely above pectoral-fin base or extending some distance ventrally in front of it; branchiostegal rays 5-6. Skin usually loose, always scaleless (prickles occasionally present), often with a gelatinous subcutaneous layer; lateral line absent. About 17 genera presently recognized and about 170 species distributed predominantly in North Pacific, North Atlantic, and southern ocean, but occurring in all oceans. Known from estuarine and intertidal zones to over 7,000 m; mostly benthic or benthopelagic, but a few holopelagic; life histories poorly known for almost all species. Fecundity generally low (fewer than 10-10,000 eggs), eggs large to very large, 1.0-8.0 mm diameter. Southern ocean has about 31 valid species, predominantly on continental slope. No commercial value.

B-47099

Anderson, M.E., **Zoarcidae: Eelpouts,** Fishes of the southern ocean, edited by O. Gon and P.C. Heemstra, Grahamstown, South Africa, J.L.B. Smith Institute of Ichthyology, 1990, p.256-276.

DLC QL637.2 F57 1990

The family and species diagnoses presented here pertain only to those species found in the southern ocean. Body and tail elongate (generally eel-shaped), body rounded or ovoid in cross section, tail laterally compressed, more so posteriorly. Head ovoid or dorsoventrally flattened. Dorsal and anal fins single, confluent with caudal, long and low. All species are benthic except *Lycodapus* and *Melanostigma,* which are bentho- or mesopelagic and primarily occur in the thalassobathyal, subantarctic regions or over seamounts like *Paraliparis.* The eelpouts are dominant among the non-notothenioid antarctic fish fauna, with a few species occurring in the isolated inner shelf basins as shallow as 140 m, but most occur on the outer slope, along the Scotia Ridge, or the encircling abyssal regions to 4000 m. Benthic zoarcids are carnivorous epi- or infaunal predators and thus feed chiefly on polychaetes, bivalves and gastropods. The pelagic species of *Lycodapus* and *Melanostigma* feed primarily on krill or other small planktonic crustaceans in southern ocean waters. There are about 220 species of zoarcids and most live in the North Pacific or North Atlantic; only 22 species are known from the area covered by this book.

B-47100

Gon, O., **Bovichtidae: Thornfishes,** Fishes of the southern ocean, edited by O. Gon and P.C. Heemstra, Grahamstown, South Africa, J.L.B. Smith Institute of Ichthyology, 1990, p.277-278.

DLC QL637.2 F57 1990

These small, mostly benthic and littoral fish bear these general characteristics: body long and compressed. Head small to large and compressed to depressed. Two dorsal fins, the first spinous. No spines in anal fin. Pelvic fins inserted in front of pectoral-fin base. Gill membranes separate and free from isthmus. Opercular spine varies from a weak, flat spine to a large, strong and pointed spine. Scales ctenoid (when present) or absent. Lateral line continuous and complete, consisting of scales or a series of tubular pores. A single nostril. Mouth protractile. Jaws, vomer and palatines with small, conical teeth. Ectopterygoid teeth present or absent. Epibranchial teeth present. Supra- orbital tentacle may be present. One radial bone of the pectoral girdle on scapula and other 2 on coracoid. Swim-bladder absent. Color: in alcohol, head dark brown. Body brown, paler on its rear part and abdomen, and with 4 dark brown saddles between lateral line and dorsal fins' base. First dorsal fin dark brown, with a black spot on posteriormost rays. Second dorsal, anal and pectoral fins with lines of dark spots. Caudal fin dusky and pelvic fins dark brown with a pale posterior margin. Known only from the type locality and Wiencke I. in the Antarctic Peninsula, in shallow inshore water.

B-47101

DeWitt, H.H., Heemstra, P.C., Gon, O., **Nototheniidae: Notothens,** Fishes of the southern ocean, edited by O. Gon and P.C. Heemstra, Grahamstown, South Africa, J.L.B. Smith Institute of Ichthyology, 1990, p.279-331.

DLC QL637.2 F57 1990

Nototheniids are carnivorous, slow growing, long-lived, naturally buoyant, and possess a natural anti-freeze glycoprotein which stops ice crystal formation. They are vulnerable to over exploitation. They are a family of about 49 valid species, of which 32 occur in the southern ocean. These features are characteristic of nototheniids: body oblong to elongate and fusiform. Usually 2 separate dorsal fins, the first of 3-11 flexible (rarely pungent) spines, the second of 25-42 segmented (soft) rays. Anal fin similar to soft dorsal fin, with 22-40 segmented rays. Pectoral fins large, with 16-33 rays, the dorsalmost ray unbranched, the rest branched. Pelvic fins jugular, with 1 weak spine and 5 branched rays. Caudal fin rounded to forked, with 10-17 branched rays. Branchiostegal membranes usually joined to isthmus, branchiostegal rays usually 6. Mouth terminal, horizontal to oblique upper jaw slightly protrusile; no teeth on vomer or palatines. A single nostril on each side of snout; no internal nares. Opercle and preopercle without spines. Gills 4, gill rakers well developed; pseudobranch present. Scales usually ctenoid, and in a few species all of the scales are smooth. One to 3 lateral lines tubed or perforated scales. Vertebrae 45-59; ribs well developed, pectoral fin skeleton with 3 radials. Swim-bladder absent. Basisphenoid usually present.

B-47102

Eakin, R., **Artedidraconidae: Plunderfishes,** Fishes of the southern ocean, edited by O. Gon and P.C. Heemstra, Grahamstown, South Africa, J.L.B. Smith Institute of Ichthyology, 1990, p.332-356.

DLC QL637.2 F57 1990

Plunderfish morphology and distribution are as follows: body tapered, head large. Two separate dorsal fins, the first with 1 to 7 flexible spines, the second with 22-30 soft (segmented) rays; anal fin with 14-21 soft rays; pectoral fins large, with 14- 22 rays; pelvic fins jugular, with 1 spine and 5 rays, the spine long and attenuated. Principal (branched) caudal-fin rays 8-11; 5 branchiostegal rays. Mouth large and protractile; jaws bearing small conical teeth; palate and vomer toothless. A single nostril on each side of snout. Opercle with a flattened hook. Gill membranes united and joined to isthmus but not forming a fold across it. Gill rakers rudimentary to well developed. Scales absent on body and head. Upper pectoral radial articulated with both scapula and coracoid, the lower 2 with coracoid. Four or 5 hypurals. Epipleural ribs 12-16, articulated with vertebral parapophyses, pleural ribs 0-8, floating. Swim-bladder absent. Vertebrae 12-18 abdominal, 19-26 caudal, total 33-41. Four genera and about 23-25 species of small to medium-size predatory benthic fish. Antarctic endemics and one species endemic to South Georgia.

B-47103

Hureau, J.C., **Harpagiferidae: Spiny plunderfishes,** Fishes of the southern ocean, edited by O. Gon and P.C. Heemstra, Grahamstown, South Africa, J.L.B. Smith Institute of Ichthyology, 1990, p.357-363.

DLC QL637.2 F57 1990

Harpagiferids are small benthic fishes feeding on small crustaceans. Most species are littoral, but some occur to depths of 180 m. They grow slowly, maturing at about 75 mm TL and 3 to 5 years old, and have rather high fecundity (70-100 eggs/g total weight). Nesting and guarding of eggs have been observed. Harpagiferids are generally restricted to subantarctic islands, but 1 species is found along the Antarctic Peninsula and another occurs at the southern tip of South America. Although of no commercial importance, harpagiferids play an important ecological role as frequent prey for higher predators (other fish and birds). One genus with 6 species in the Southern Hemisphere. The 6 species are closely related and sometimes difficult to distinguish from each other. Fin ray counts and body proportions do not help in species identification.

B-47104

Gon, O., **Bathydraconidae: Dragonfishes,** Fishes of the southern ocean, edited by O. Gon and P.C. Heemstra, Grahamstown, South Africa, J.L.B. Smith Institute of Ichthyology, 1990, p.364-380.

DLC QL637.2 F57 1990

Dragonfishes have these characteristic features: a long body, 7-28 cm, slender to robust, subcylindrical or somewhat depressed anteriorly and compressed posteriorly; a single long-based dorsal fin without spines; anal fin usually shorter than dorsal fin, also without spines; pectoral fins well developed; pelvic fins with 1 spine and 5 branched rays, their origin anterior to pectorals. Head is moderate to large, depressed in some species, snout long and spatulate, to short and pointed. Mouth large, jaws usually with small, conical teeth and sometimes canines; palatines without teeth; vomer also edentate (except in *Vomeridens).* A single external nostril; body is scaled (usually ctenoid), bony plated or naked. Swim-bladder absent. Vertebrae 45-79. A pair of small bones attached to the anterolateral region of the ethmoid cartilage are unique to bathydraconid fishes. No basisphenoid. Cartilage between epihyal and ceratohydal I-shaped. First basibranchial ossified, second basibranchial cartilaginous. Ten genera and 15 species of small benthic fishes endemic to the southern ocean. Most species are found over the antarctic continental shelf and slope, but some are known from antarctic and subantarctic islands. Bathydraconids occur from shallow, inshore waters down to about 3,000 m. No commercial value.

B-47105

Iwami, T., Kock, K.H., **Channichthyidae: Icefishes,** Fishes of the southern ocean, edited by O. Gon and P.C. Heemstra, Grahamstown, South Africa, J.L.B. Smith Institute of Ichthyology, 1990, p.381-399.

DLC QL637.2 F57 1990

Body elongate and tapered. Head depressed; snout depressed and spatulate, with a single nostril. Two separate dorsal fins, first with 3-15 weak spines and the second with 26-47 soft rays. Anal-fin rays 24-49. Pectoral fin large and fanlike, with 19-27 rays. Pelvic fins jugular, broad or elongate. Principal branched caudal-fin rays 11-12. Mouth large and not protractile; teeth in both jaws small, conical, in narrow bands. Opercular bones usually with radiating ridges terminating in branched or simple spines; upper part of cleithrum not bifurcate; spines on sub- and interopercles present or absent. Two or three lateral lines of tubular scales or bony plates. Gill rakers dentigerous or vestigial; two pharyngobranchials. Vertebrae, 22-31 abdominal; 25-43 caudal; total 49-71. Ribs not ossified. Basisphenoid absent. Swim-bladder absent. The Channichthyidae are unique among vertebrates in the complete, or nearly complete lack of haemoglobin in their blood cells. Antarctic endemics; eleven genera and 15 (Hureau 1985) or 16 species of primarily benthic fish, but showing a rather active vertical migration to feed on pelagic prey. Some species are commercially exploited. They have been captured near Bouvet I., the islands of the Scotia Sea, the Antarctic Peninsula, and coastal regions from the Weddell Sea eastward to the Davis Sea and from the western Ross Sea westward to Dumont d'Urville.

B-47106

Gon, O., **Tripterygiidae: Triplefins,** Fishes of the southern ocean, edited by O. Gon and P.C. Heemstra, Grahamstown, South Africa, J.L.B. Smith Institute of Ichthyology, 1990, p.400-401.

DLC QL637.2 F57 1990

Body elongate and compressed. Three distinct dorsal fins, first 2 spinous, with the following range of fin rays: II-IX+X-XXV+7-17. Rays of third dorsal fin segmented, last ray usually split to base. Anal-fin rays 0-II,14-32. Pectoral-fin rays 10-19, lower- and uppermost rays unbranched. Pelvic-fin rays I,2-3, spine short and covered by skin. First gill arch attached to opercle. Scales mostly ctenoid, but some species with only cycloid scales. Lateral line either complete, with tubular scales, or interrupted with anterior section of tubular scales and posterior (lower) section of notched scales. Mouth small, usually with a band of small conical teeth on each jaw. Nasal and orbital tentacles sometimes present, simple or branched. Small, cryptically colored benthic fishes inhabiting rocky habitats from the intertidal zone to about 200 m. Sexual dimorphism and dichromatism shown by many species. Males larger and more colorful than females. Found in shallow tropical and temperate waters of all oceans, a single species recorded from inshore waters of the Antarctic Peninsula. Global classification estimates vary from 16- 19 genera and 75 to more than 130 species.

B-47107

Nakamura, I., **Gempylidae: Snake mackerels,** Fishes of the southern ocean, edited by O. Gon and P.C. Heemstra, Grahamstown, South Africa, J.L.B. Smith Institute of Ichthyology, 1990, p.402-403.

DLC QL637.2 F57 1990

Body elongate and compressed or semifusiform; mouth large and nonprotractile with strong teeth in both jaws; several pairs of teeth on anterior part of upper jaw and a pair of teeth on tip of lower jaw, often fang-like. Gill openings wide, left and right gill membranes not united with each other, free from isthmus; gill rakers small and spinescent with the raker at angle largest, few in number, mostly 0-15 up to about 40; branchiostegal rays 7. Nostrils double. Two continuous dorsal fins, base of first longer than that of second (excluding finlets, if present), VIII-XLIV, 0-II, 8-41+2-8 finlets; anal fin similar to and slightly smaller than second dorsal fin, I-II, 8-35+2-7 finlets; pectoral fin rather short midlateral or somewhat low in position, rays 12-19; pelvic fins thoracic, completely absent or present, sometimes rudimentary, I, 0-5; caudal fin forked, various in size; no keels on caudal peduncle. Lateral line single or double; scales thin and small or rudimentary, sometimes modified. Sixteen genera and about 20 species of medium to large size predatory fishes. One species occurs in the southern ocean throughout the CCAMLR area.

B-47108

Nakamura, I., **Scombridae: Tunas,** Fishes of the southern ocean, edited by O. Gon and P.C. Heemstra, Grahamstown, South Africa, J.L.B. Smith Institute of Ichthyology, 1990, p.404-405.

DLC QL637.2 F57 1990

Body elongate and fusiform, moderately compressed in lower scombrids. Mouth rather large and nonprotractile with strong but rather small teeth in both jaws. Snout pointed and stout, forming beak-like structure; nostrils double. Gill openings wide; left and right gill membranes not united with each other free from isthmus; gill rakers absent to numerous, 0-80; branchiostegal rays 7. Two dorsal fins and several finlets present; first dorsal fin usually low and short, continuous with or separated by a short interspace from second dorsal fin, depressible into a groove, IX- XVII, 10-25+5-11 finlets; anal fin similar to and slightly smaller than second dorsal fin, 9-I, 10-25+5-12 finlets; pectoral fin midlateral, the rays 18-38; pelvic fins thoracic and well developed. Two small caudal keels in lower scombrids on each side of caudal peduncle. Lateral line single or double. Scales rather small and thin; corselet and postorbital thick scaly area developed in higher scombrids. Fifteen genera and 49 species of medium size to enormous predatory fishes. One species occurs in the southern ocean.

B-47109

Heemstra, P.C., **Centrolophidae: Driftfishes,** Fishes of the southern ocean, edited by O. Gon and P.C. Heemstra, Grahamstown, South Africa, J.L.B. Smith Institute of Ichthyology, 1990, p.406-407.

DLC QL637.2 F57 1990

Body oblong/elongate, compressed. Dorsal fin long, the spines hard or soft and flexible, the spinous and soft-rayed parts more or less continuous; median fins mostly covered with skin and scales, the rays difficult to count; pelvic fins present. Scales small, usually cycloid and often deciduous. Head with numerous small pores. Opercle with 1 or 2 weak spines. Minute teeth in jaws, none on vomer, palatines, endopterygoids or tongue. Branchiostegals usually 7, the membranes separate. This family comprises 7 genera and about 30 species; represented in all oceans, from polar to tropical waters. Pelagic fishes of the open ocean, but some species are found near shore and are often taken in bottom trawls. Only 1 genus is represented in the southern ocean. Juveniles are known both north and south of the Antarctic Convergence and are probably circumpolar between 50 and 60S. The species has been reported from South Georgia.

B-47110

Heemstra, P.C., **Achiropsettidae: Southern flounders,** Fishes of the southern ocean, edited by O. Gon and P.C. Heemstra, Grahamstown, South Africa, J.L.B. Smith Institute of Ichthyology, 1990, p.408-413.

DLC QL637.2 F57 1990

Body greatly compressed; both eyes on left side of head. Dorsal and anal fins separate from caudal fin; no fin spines; pectoral fins rudimentary (in juveniles) or absent; left pelvic fin with 4-8, right with 4-7 rays; base of left pelvic fin distinctly longer than right one, its anterior part on ventral midline of isthmus, and rear part of fin curving slightly onto eyed side; fin rays of all fins unbranched (except median caudal rays). Preopercle edge more or less covered by skin and scales. Lateral line straight (no distinct arch anteriorly), well developed on both sides of body. Branchiostegal membranes separate. No teeth on vomer. Neural spine of first vertebra absent; no transverse apophyses on vertebrae; epipleural and pleural ribs present. Caudal fin skeleton with 5 separate hypurals, none fused to the ural centra; epural not fused to 5th hypural. Egg with multiple oil globules. Three genera and 4 species of small to medium-size benthic fish of antarctic and subantarctic waters.

B-47111

Feller, G., **Lactate dehydrogenase of the icefish heart: biochemical adaptations to hypoxia tolerance,** *Biochimica et biophysica acta,* 1991 1079(3), p.343-347, 25 refs.

Cardiac lactate dehydrogenase from the hemoglobin- and myoglobin-free antarctic icefish was purified by affinity chromatography. Structural and kinetic properties of the enzyme were found close or identical to those of its skeletal muscle counterpart and other M-type lactate dehydrogenases. A model involving a dual oxidative-anaerobic metabolism of the icefish heart is proposed. (Auth.)

B-47112

Kooyman, G.L., **Heart rates and swim speeds of emperor penguins diving under sea ice,** *Journal of experimental biology,* 1992 Vol.165, p.161-180, Refs. p.179-180.

Heart rate during overnight rest and while diving were recorded from 5 emperor penguins with a microprocessor-controlled submersible recorder. Heart rate, cardiac output and stroke volume were also measured in 2 resting emperor penguins using standard electrocardiography and thermodilution measurements. Swim velocities from 8 birds were obtained with the submersible recorder. The resting average of the mean heart rates was 72 beats/min. Diving heart rates were about 15% lower than resting rates. Cardiac outputs of 1.9-2.9 ml/kg/s and stroke volumes of 1.6-2.7 ml/kg were similar to values recorded from mammals of the same body mass. Swim velocities averaged 3 m/s. The swim speeds and heart rates suggest that muscle O2 depletion must occur frequently: therefore, many dives require a significant energy contribution from anaerobic glycolysis. (Auth.)

B-47113

Castellini, M.A., Kooyman, G.L., Ponganis, P.J., **Metabolic rates of freely diving Weddell seals: correlations with oxygen stores, swim velocity and diving duration,** *Journal of experimental biology,* 1992 Vol.165, p.181-194, Refs. p.192-194.

The metabolic rates of freely diving Weddell seals were measured using modern methods of on-line computer analysis coupled to oxygen consumption instrumentation. Oxygen consumption values were collected during sleep, resting periods while awake, and during diving periods with the seals breathing at the surface of the water in an experimental sea-ice hole at McMurdo Station. Oxygen consumption during diving was not elevated over resting values but was statistically about 1.5 times greater than sleeping values. The metabolic rate of diving declined with increasing dive duration, but there was no significant difference between resting rates and rates in dives lasting up to 82 min. Swimming speed, measured with a microprocessor velocity recorder, was constant in each animal. Calculations of the aerobic dive limit of these seals were made from the oxygen consumption values and demonstrated that most dives were within this theoretical limit. The results indicate that the cost of diving is remarkably low in Weddell seals relative to other diving mammals and birds. (Auth.)

B-47116

Bernhard, J.M., **Ecology of benthic foraminifera with emphasis on their distribution and anoxic sediments,** San Diego, University of California, 1990, 168p., University Microfilms order No. 91-10692, Ph.D. thesis. 12 refs.

Deep-sea and shallow-water benthic foraminiferal distributions were assessed over spatial and temporal scales, with a primary focus on vertical distributions in sediments, especially related to porewater dissolved oxygen concentrations. To distinguish living from dead foraminifera, an adeonosine triphosphate (ATP) assay was used, along with conventional staining techniques to allow comparison with published works. The ATP assay was also used to estimate foraminiferal biomass. In addition, foraminiferal ultrastructure was examined in individuals removed from oxygenated as well as anoxic conditions. Foraminiferal distributions were patchy on horizontal scales (cm to m) in Explorers Cove, and differences in distributions on the east and west sides of McMurdo Sound also existed. Major differences in the geochemistry and foraminifera exist between homogenized slope and laminated central basin sediments. Experimental results reveal that foraminifera from Explorers Cove can withstand anoxia or combined anoxia and H2S for 4 weeks. The proportion of individuals living and the average ATP content per individual were not significantly affected over the experimental duration. (Auth. mod.)

B-47121

Fraser, W.R., **Aspects of the ecology of Kelp Gulls *(Larus dominicanus)* on Anvers Island, Antarctic Peninsula,** Minneapolis, University of Minnesota, 1989, 102p., University Microfilms order No. 90-19062, Ph.D. thesis. Refs. p.98-102.

The purpose of this study was to examine aspects of the ecology of Kelp gulls in Antarctica, with a focus on detailing their relationship with their primary prey, the antarctic limpet *Nacella concinna.* On the Antarctic Peninsula, the availability of littoral limpets to foraging Kelp gulls was determined by ice and tides. Gulls employed two depth-specific methods to capture limpets, including surface seizing and plunging. The frequency of occurrence of limpets in the diet varied between 48 and 92%. The breeding range of Kelp gulls in Antarctica coincides precisely with that of the limpet. It was observed that gulls holding foraging territories bred earlier, had larger clutch sizes and fledged more chicks. Chick survival, however, was independent of territory quality, supporting the idea that limpet resources are, functionally, adult specific. It is suggested that without limpets, early breeding would be impossible in Antarctica and gulls would likely be displaced by the more aggressive South Polar skuas *(Catharacta maccormicki).* (Auth. mod.)

B-47123

Williams, T.D., **Diving pattern and performance in relation to foraging ecology in the gentoo penguin, *Pygoscelis papua*,** *Journal of zoology,* June 1992 227(2), p.211-230, Refs. p.228-230.

Data are presented on diving pattern and performance (dive depth, duration, frequency and organization during the foraging trip) in gentoo penguins *Pygoscelis papua,* obtained using time-depth recorders (n=9 birds, 99 foraging trips). These data are used to estimate various parameters of foraging activity, e.g. foraging range, prey capture rates, and are compared in relation to breeding chronology. Foraging trip duration was 6 h and 10 h, and trip frequency 1.0/day and 0.96/day, during the brooding and creche periods, respectively. Birds spent on average 52% of each foraging trip diving. For deep dives, dive duration exceeded the subsequent surface interval, but shallow dives were followed by surface intervals of 2-3 times dive duration. Deep dives showed clear diel patterns averaging 40 m at dawn and dusk and 80-90 m at midday. Estimated foraging ranges were 2.3 km and 4.1 km during the brood and creche period, respectively. Foraging trip duration increased by 4 h between the brood and creche periods but total time spent in deep dives (i.e. time spent feeding) was the same (3 h). Of 99 foraging trips, 56% consisted of only one dive bout and 44% of 2-4 bouts delimited by extended surface intervals >10 min. It is suggested that this pattern of diving activity reflects variation in spatial distribution of prey rather than the effect of physiological constraints on diving ability. (Auth. mod.)

B-47124

Klages, N.T.W., Cooper, J., **Bill morphology and diet of a filter-feeding seabird: the broad-billed prion *Pachyptila vittata* at South Atlantic Gough Island,** *Journal of zoology,* July 1992 227(3), p.385-396, 35 refs.

One hundred and fifty diet samples collected from broad-billed prions *Pachyptila vittata* at Gough I. and Tristan da Cunha over 4 years during the breeding season showed that they fed almost exclusively on copepods (0.7-4.1 mm in size), consistent with a bill morphology adapted for filter-feeding. Food is sieved from the surface of the ocean by means of palatal lamellae, of which there are 112-136 on either side, 0.16 mm apart. The filtration area of both rows of lamellae together amounted to 785 sq mm and the bill held 4.1 ml of water with a maximally extended mandibular pouch. Both sexes of broad-billed prions look outwardly alike but morphometric measurements proved that males are slightly larger. (Auth.)

B-47127

Davison, W., Franklin, C.E., Mckenzie, J.C., Dougan, M.C.R., **Effects of acute exposure to the water soluble fraction of diesel fuel oil on survival and metabolic rate of an antarctic fish *(Pagothenia borchgrevinki)*,** *Comparative biochemistry and physiology,* May 1992 102C(1), p.185-188, Refs. p.187-188.

The antarctic teleost *Pagothenia borchgrevinki* was exposed to the water soluble fraction of diesel fuel oil. Under the acute time frame used, no mortalities occurred, even at high concentrations. Exposure to the oil caused elevations in metabolic rates and a 50% increase in haematocrit. Plasma chloride levels did not change. (Auth.)

B-47134

Itonori, S., **Characterization of a new phosphonocerebroside, *N*-methyl-2-aminoethylphosphonylglucosylceramide, from the antarctic krill, *Euphausia superba*,** *Biochimica et biophysica acta,* 1991 1081(3), p.321-327, 24 refs.

A novel phosphonoglycosphingolipid was purified from the whole tissue of the antarctic krill, *Euphausia superba* by successive column chromatography on DEAE- and QAE-Sephadex and silicic acid (Iatrobeads). The structure was elucidated by means of IR, FAB-MS, 1H-NMR, GC and GC-MS analyses of the water-soluble products after complete and partial acid hydrolysis, and methylation analysis of a product of hydrogen fluoride degradation; it was identified to be a phosphonocerebroside, 6'-*O-(N-* methyl-2-aminoethylphosphonylglucosylceramide). The ceramide moiety was composed of tetradecasphingenine and octadecasphingatriene as the main sphingoids, and monounsaturated C22- and C24-acids and their 2-hydroxy homologues as the major fatty acids. (Auth.)

B-47135

Chappell, D.F., O'Kelly, C.J., **Ultrastructure and taxonomy of the antarctic terrestrial alga *Trichosarcina mucosa* (Broady) comb. nov. (Ulotrichales, Chlorophyta),** *Cryptogamic botany,* Nov. 8, 1991 2(2-3), p.252-257, 28 refs.

Ultrastructural analysis of vegetative cells and zoospores of the endemic antarctic terrestrial green alga previously known as *Pseudoschizomeris mucosa* Broady (Chaetophorales) shows that this species belongs to the morphologically similar but only distantly related genus *Trichosarcina* (Ulotrichales). Zoospores of *T. mucosa* Broady) comb. nov. lack body scales, and growth and reproduction of *T. mucosa* in culture are impaired at temperatures above 10 C. These features help distinguish *T. mucosa* from *T. polymorpha* Nichols and Bold, the type and only other species in the genus. Ultrastructural methods have seldom been applied to taxonomic studies of antarctic terrestrial algae; more widespread use of these methods should provide a more accurate assessment of the diversity and endemism of this flora. (Auth.)

B-47136
Atkinson, A., Ward, P., Williams, R., Poulet, S.A., **Feeding rates and diel vertical migration of copepods near South Georgia: comparison of shelf and oceanic sites,** *Marine biology,* 1992 114(1), p.49-56, Refs. p.55-56.

Seventeen Longhurst Hardy Plankton Recorder profiles were taken over a diel cycle in Jan. 1990 to study the feeding of 4 major copepods over the South Georgia shelf. Ontogenetic changes in vertical migration were followed and feeding cycles determined by gut fluorometry for *Calanoides acutus* Stage CV, *Calanus simillimus* CV and CVI female, *C. propinquus* CV and *Rhincalanus gigas* CV and CVI female. In common with a neighboring oceanic site visited two weeks later and reported elsewhere, all four species had a diel cycle of feeding and migration. The vertical distributions of *C. simillimus* (all stages), *R. gigas* (nauplii) and *Euphausia frigida* (postlarvae) were similar at both sites, the night being spent within the chlorophyll maximum at 15 to 30 m. However, the biomass dominants, *C. acutus* and *R. gigas,* dwelt below the chlorophyll maximum, about 30 m deeper than their oceanic counterparts. Unlike the oceanic site, feeding at the shelf site was not restricted to darkness, but increased 6 to 10 h before nightfall and finished at dawn; the intervening period coincided with sinking and digestion. (Auth. mod.)

B-47138
Berkman, P.A., **Antarctic marine ecosystem and humankind,** *Reviews in aquatic sciences,* 1992 p.295-333, 377 refs.

In this review of the present state of the antarctic marine ecosystem and how it achieved this status, these aspects are examined: the basic geology of the Antarctic; currents, water masses, and zones of the southern waters; evolution and adaptations of the ecosystem; human impacts on the system; and trophic dynamics. The system is also looked upon from the resource utilization viewpoint and the exploitation of the creatures is briefly laid out in discussions of seals, whales, birds, fish, krill, and potential fisheries. Attempts toward the conservation of marine resources on an international basis are recounted and milestones in the journey into conservation are highlighted, including the development of the Antarctic Treaty System and the concepts of antarctic protected areas, the rational use of antarctic marine species, and increased emphasis on environmental protection. The review closes with a look at future considerations, emphasizing the global aspects and impacts of this model international laboratory.

B-47139
Puskeppeleit, M., **Long-term dosimetry of solar UV radiation in Antarctica with spores of *Bacillus subtilis,*** *Applied and environmental microbiology,* Aug. 1992 58(8), p.2355-2359, 18 refs.

The main objective of this study was to assess the influence of the seasonal stratospheric ozone depletion on the UV climate in Antarctica by using a biological test system. This method is based on the UV sensitivity of a DNA repair-deficient strain of *Bacillus subtilis* (TKJ 6321). In the field experiment, dried layers of *B. subtilis* spores on quartz discs were exposed in different seasons in an exposure box open to solar radiation at Georg von Neumayer Station. The UV-induced loss of the colony-forming ability was chosen as the biological end point and taken as a measure for the absorbed biologically harmful UV radiation. Inactivation constants were calculated from the resulting dose-response curves. The results of field experiments performed in different seasons indicate a strongly season-dependent trend of the daily UV-B level. Exposures performed at extremely depleted ozone concentrations (Oct. 1990) gave higher biologically harmful UV-B levels than expected from the calculated season- dependent trend, which was determined at normal ozone values. These values were similar to those measured during the antarctic summer, indicating that the depleted ozone column thickness has an extreme influence on the biologically harmful UV climate on the ground. (Auth.)

B-47141
Stoecker, D.K., Buck, K.R., Putt, M., **Changes in the sea-ice brine community during the spring-summer transition, McMurdo Sound, Antarctica. I. Photosynthetic protists,** *Marine ecology progress series,* Aug. 13, 1992 84(3), p.265-278, 51 refs.

During the austral spring, a characteristic microbial community develops in the sub-surface brine pockets and channels of the annual land-fast sea ice in McMurdo Sound. This community is distinct from the diatom-dominated community that develops in the channels at the base of the sea ice, at the seawater/ice interface, and in the platelet layer. The photosynthetic biomass in the brine pockets is dominated by athecate dinoflagellates. Chrysophyte statocysts (sometimes known as archaeomonads) and <5 micron photosynthetic flagellates are also characteristically found in this assemblage. In Dec., chlorophyll *a* content and biomass peak, and photosynthetic gymnodinioid dinoflagellates can reach densities of over 1000/ml of brine. The photosynthetic dinoflagellates form cysts (hypnozygotes) during late Dec. and early Jan., and chrysophyte statocysts also become abundant. During austral summer, total autotrophic biomass in the upper ice brine decreases due to dilution by melt water, flushing of brine into the water column, and grazing. By late summer, the annual sea ice in McMurdo Sound has broken out. The yearly decay and retreat of sea ice introduces a characteristic set of brine protists and their cysts into McMurdo Sound. (Auth.)

B-47157
Dragonetti, J.P., **Enterobacteriaceae family from King George I.** [Estudio de la familia Enterobacteriaceae en la Isla Rey Jorge. Bahía Fildes, aguas interiores y fauna], *Montevideo. Instituto Antártico Uruguayo. Actividad científica 1987/88,* Sep. 1989 Vol.3, p.51-56, In Spanish with English summary. 17 refs.

The continuation of an Enterobacteriaceae family study, initiated in 1987, is reported. Samples were taken in sea water, ground water and fauna at King George I. All samples were processed by filter-membrane technique (0.45 micron). Identification was made by biochemical reaction and tinctorial techniques. The following groups were isolated: Escherichia, Enterobacter, Klebsiella, Shigella, Citrobacter, Serratia, Hafnia and Edwardsiella. (Auth.)

B-47158
Alvarez Cotelo, B.J., Fros Fros, T., Puig Bur, J.E., Sánchez Méndez, J.A., **Eco-ethological variables in a rookery on Ardley I.** [Estudio de algunas variables eco-etológicas en una pingüinera de *Pygoscelis papua* en las Islas Shetland del Sur, Isla Ardley], *Montevideo. Instituto Antártico Uruguayo. Actividad científica 1987/88,* Sep. 1989 Vol.3, p.59-75, In Spanish with English summary. 19 refs.

An eco-ethological study on *Pygoscelis papua* penguins on Ardley I. is reported. Zootechnical norms, and the evaluation of the effects of human presence on the birds, are determined based on the analysis of six variables which are summarized as follows: a calendar of the penguins' arrival, breeding, and leaving Ardley I.; change of feathers and behavior; perturbations caused during reproduction by sound stimuli from man's activities; construction and distribution of nests; incubation; and limitation of space and adaptability.

B-47159
Alvarez Cotelo, B.J., Fros Fros, T., Puig Bur, J.E., Sánchez Méndez, J.A., ***Pygoscelis papua* adaptation to stress on Ardley I.** [Síndrome General de Adaptación en *Pygoscelis papua* a través de parámetros etológicos, biológicos y de productividad en una pingüinera. Islas Shetland del Sur, Isla Ardley], *Montevideo. Instituto Antártico Uruguayo. Actividad científica 1987/88,* Sep. 1989 Vol.3, p.77-86, In Spanish with English summary. 26 refs.

A study of the degree of stress in *Pygoscelis papua* penguins caused by the presence of man in the proximity of their nests is discussed. Negative effects of fences and unfamiliar sounds are found mainly during the nest-building period. The stress effects are observed in the birds' behavior and laboratory results, and are identified with the General Adaptation Syndrome. Under such circumstances, a lower reproduction rate is found. (Auth. mod.)

B-47160
Alvarez Cotelo, B.J., Fros Fros, T., Puig Bur, J.E., Sánchez Méndez, J.A., **Egg-laying and fertility in *Pygoscelis papua*** [Postura y fertilidad en *Pygoscelis papua*], *Montevideo. Instituto Antártico Uruguayo. Actividad científica 1987/88,* Sep. 1989 Vol.3, p.87-100, In Spanish with English summary. 22 refs.

Various experiments with egg removal were carried out in three series of *Pygoscelis papua* nests; each was performed at a different stage of the egg-laying and incubation period. The following results are found: the egg-laying stimulus can be modified; fertility can be maintained; and a significant increase in the production of nutrients is noted during the brief incubation period, since each female can replace up to five fertile eggs.

B-47161
Grillo, B.A., **Lipids and Omega 3 series concentrations in fatty acids of antarctic krill** [Estudio de las características lipídicas y del contenido en ácidos grasos de la serie *Omega* 3 del krill antártico *Euphausia superba*], *Montevideo. Instituto Antártico Uruguayo. Actividad científica 1987/88,* Sep. 1989 Vol.3, p.101-109, In Spanish with English summary. 30 refs.

The lipidic constituents of krill are examined as natural source of fatty acids of the *Omega* 3 series due to their anti-atherogenic properties. The total lipidic content of krill is 4.73 g/100 g wet weight, 4.42 g of which correspond to total fatty acids with predominance of polyunsaturated fatty acids in a Pl/S ratio of 1:5. The fatty acid content of the *Omega* 3 series is 1.47 g/100 g; ODA 212 mg/100 g; EPA 796 mg/100 g; DHA 464 mg/100 g. The amount of cholesterol is 30 mg/100 g krill. It is concluded that krill presents peculiar lipidic features which place it among the anti-atherogenic marine products. Moreover, its rich biomass constitutes a natural reserve of *Omega* 3 series of fatty acids. (Auth. mod.)

B-47165
Branch, M.L., Griffiths, C.L., Kensley, B., Sieg, J., **Benthic Crustacea of subantarctic Marion and Prince Edward Islands: illustrated keys to the species and results of the 1982-1989 University of Cape Town Surveys,** *South African journal of antarctic research,* 1991 21(1), p.3-44, Refs. p.43-44.

The benthic fauna of Marion and Prince Edward Is. was sampled over the period 1982-1989 by dredging, scuba-diving and intertidal surveys. This paper comprises illustrated keys for the identification of all Crustacea recorded from the islands during this and previous surveys. Summaries are also provided of the depth distributions, abundances and habitats of all species collected during the 1982-1989 surveys. A total of 125 species of Crustacea is now known from the islands; of these 49 are new records for the area including 12 presumed new species. The current fauna comprises 2 new records of Cirripedia (1 unidentified); 71 species of Amphipoda (of which 17 are new records and include 8 presumed new species); 32 species of Isopoda (including 19 new records of which 4 are new species); 10 Tanaidacea (8 new records); and II Decapoda (of which 4 are new records). The new species are identified to genus and are not formally described in this paper. (Auth.)

B-47166
Branch, M.L., Arnaud, P.M., Cantera, J., Gianakouras, D., **Benthic Mollusca and Brachiopoda of subantarctic Marion and Prince Edward Islands: 1. Illustrated keys to species. 2. Records of the 1982-1989 University of Cape Town Surveys,** *South African journal of antarctic research,* 1991 21(1), p.45-64, 25 refs.

Part 1 of this paper presents illustrated keys for the identification of the benthic molluscan and brachiopod fauna (excluding the non-shelled gastropods) of Marion and Prince Edward Is. These are based on both published records and unpublished collections made by the *Marion-Dufresne* 1974-1976 and the University of Cape Town, 1982-1989. There were 85 species of Mollusca consisting of 32 Bivalvia (3 unidentified species, 13 new records), 46 Gastropoda (4 unidentified species, 24 new records), 4 Polyplacophora (1 unidentified), 1 Scaphopoda, 1 Solenogastres (a new unidentified record) and 1 Cephalopoda. There were 3 species of Brachiopoda. In part 2, records of the dredging, scuba-diving and intertidal surveys undertaken by the University of Cape Town (1982-1989) are summarized for the Mollusca and Brachiopoda in relation to abundance, depth, substratum and community grouping. (Auth. mod.)

B-47167
Arnaud, F., Branch, M.L., **Pycnogonida of subantarctic Marion and Prince Edward Islands: illustrated keys to species,** *South African journal of antarctic research,* 1991 21(1), p.65-71, 26 refs.

The Pycnogonida of Marion and Prince Edward Is. were sampled over the period 1973-1989 by dredging, scuba-diving and intertidal surveys undertaken by the University of Cape Town, and in 1976 deep water sampling by the French vessel *Marion-Dufresne* campaign MD.08. This paper comprises illustrated keys for the identification of the 17 species of Pycnogonida recorded from the area. Of these, 14 are new records for the area and one, still unidentified, a presumed new species. The bathymetric range and geographical distribution of the species are outlined. (Auth.)

B-47200
Cullen, J.J., Neale, P.J., Lesser, M.P., **Biological weighting function for the inhibition of phytoplankton photosynthesis by ultraviolet radiation,** *Science,* Oct.23, 1992 258(5082), p.646-650, Numerous refs.

Severe reduction of stratospheric ozone over Antarctica has focused increasing concern on the biological effects of ultraviolet-B (UVB) radiation (280 to 320 nanometers). Measurements of photosynthesis from an experimental system, in which phytoplankton are exposed to a broad range of irradiance treatments, are fit to an analytical model to provide the spectral biological weighting function that can be used to predict the short-term effects of ozone depletion on aquatic photosynthesis. Results show that UVA (320 to 400 nanometers) significantly inhibits the photosynthesis of a marine diatom and a dinoflagellate, and that the effects of UVB are even more severe. Application of the model suggests that the antarctic ozone hole might reduce near-surface photosynthesis by 12 to 15%, but less so at depth. The experimental system makes possible routine estimation of spectral weightings for natural phytoplankton.

B-47202
U.S. Congress. House. Committee on Merchant Marine and Fisheries. Subcommittee on Fisheries and Wildlife Conservation and the Environment. Subcommittee on Oceanography, Great Lakes, and the Outer Continental Shelf. Subcommittee on the Coast Guard and Navigation, **Joint hearing on efforts to negotiate a protocol to the Antarctic Treaty that would provide comprehensive environmental protection for that continent,** Washington, D.C., U.S. Government Printing Office, 1991, 40p. Serial No. 102-1.

The hearing convened Mar. 5, 1991 to receive testimony on the results of a Special Consultative Party meeting in Chile in Nov./Dec. 1990. The negotiations there were a prelude to a meeting scheduled for Madrid in Apr. 1991 where it is hoped that a protocol could be agreed to for the protection of the antarctic environment. Representatives from the Dept. of State provided written statements giving details of the proceedings in Chile, and they were confident that the session discussions could serve as a working paper from which a protocol could be developed. Questions from the Committee and Subcommittees covered tourism, waste disposal, judicial redress, enforcement procedures of such a protocol, a mineral regime for Antarctica, oil spills, and solicitations, if any, from the general public on environmental protection in Antarctica, the rights of private suits against Federal agencies, and liability mechanisms

B-47212
Sagar, P.M., **Aspects of the breeding and feeding of Kerguelen and Antarctic terns at the Kerguelen Islands,** *Notornis,* Sep. 1991 38(3), p.191-198, 18 refs.

The breeding and feeding of Kerguelen terns *(Sterna virgata)* and antarctic terns *(S. vittata)* were studied at the Kerguelen Is. in Jan-Feb. 1985. The laying period was estimated to have ended during the third week of Dec. for Kerguelen terns, and started during the last week of Dec. for antarctic terns. Kerguelen terns used a wide variety of feeding techniques in marine, freshwater and terrestrial habitats. Marine crustaceans, fish and terrestrial invertebrates were the main prey. Antarctic terns fed only in marine habitats, where crustaceans were the main prey. Even when feeding close together, the terns were seldom aggressive. Contrary to previous reports, Kerguelen terns fed fish to chicks and fledglings despite the presence of antarctic terns. Frequent strong winds prevail at the subantarctic islands, and so wind speed is probably the most important factor affecting the ecology of Kerguelen and antarctic terns. (Auth.)

B-47214
Müller, D.G., Stache, B., **Worldwide occurrence of virus infections in filamentous marine brown algae,** *Helgoländer Meeresuntersuchungen,* 1992 46(1), p.1-8, 12 refs.

Virus infections were detected in *Ectocarpus siliculosus* and *Ectocarpus fasciculatus* on the coasts of Ireland, California, Peru, southern South America, Australia and New Zealand; in 3 *Feldmannia* species on the coasts of Ireland, continental Chile and Archipelago Juan Fernandez (Chile); and in *Leptonematella* from Antarctica. In Jan. 1988, an abnormal specimen of *L. fasciculata* was collected at Bahia Fildes, King George I., and preserved as a permanent slide. Examination of this material shows that apical portions of mature filaments consist of series of hyaline cells, the contents of which stain intensely with acetocarmine. Some cells with functional plurilocular zoidangia are interspersed in a mosaic manner, thus confirming the characteristic features of virus symptoms for *Leptonematella.* It is suggested that virus infections are a common and worldwide phenomenon in filamentous brown algae. (Auth. mod.)

B-47215
Dill, K., Huang, L., Bearden, D.W., Feeney, R.E., **Structural studies of antarctic fish antifreeze glycoproteins by one- and two-dimensional NMR spectroscopy,** *Journal of carbohydrate chemistry,* 1992 11(4), p.499-517, 28 refs.

The solution structure of antifreeze glycoproteins (AFGP's) of the polar fish *Trematomus borchgrevinki* has been investigated by 2D H-1 NMR spectroscopy as well as molecular modeling calculations (MM2). The simple glycotripeptide repeating structure in the shorter AFGP's (fractions 7 & 8) makes the structural analysis amenable. Information about the protein secondary structure was obtained by the coupling constants between the back-bone amide and alpha- carbon protons. Additional three-dimensional constraints were obtained from NOESY through-space connectivities. The three- dimensional solution structures of several AFGP's glycotripeptide fragments were based on MM2 calculations. The model structure was compared with the experimental data. Exchange rates of amide protons measured by dynamical spectroscopy show that the threonine and some of the alanine amide protons have two different and distinct exchange rates. GalNAc and the C-terminal Ala' amide protons appear to show relatively slow exchange rates. The results suggest that the amide protons are not involved in any strong intramolecular hydrogen bonding. (Auth. mod.)

B-47216
Boltovskoy, D., Alder, V.A., **Microzooplankton and tintinnid species-specific assemblage structures: patterns of distribution and year-to-year variations in the Weddell Sea (Antarctica),** *Journal of plankton research,* Oct. 1992 14(10), p.1405-1423, Refs. p.1422-1423.

Silicoflagellates, large heterotrophic dinoflagellates, radiolarians, tintinnids and microcrustaceans were counted in 72 screened samples retrieved at 0-150 m from the Weddell Sea in Jan. 1989. Tintinnid species were identified and biomass estimates were carried out for all groups on the basis of measurements of cell dimensions. Dinoflagellates dominated the microheterotrophic community at all stations and depths, followed by the tintinnids, microcrustaceans and radiolarians. All groups, with the exception of silicoflagellates, peaked noticeably in the vicinity of the southern end of the transect. Relationships between concentrations of chlorophyll *a* and microzooplanktonic biomass were present, yet not altogether consistent, but both phyto- and microzooplankton seemed to generally respond to regional enhancements associated with the ice edge. Comparison with similar Weddell and Weddell-Scotia data retrieved in Feb.-Mar. 1987 and Nov. 1988-Dec. 1989, respectively, are highly coherent in terms of microplanktonic abundances, their geographic and vertical distribution patterns, and the specific make-up and distribution of tintinnid assemblages. Analyses of the oral diameters of tintinnid morphotypes suggest that the latitudinal and vertical distribution of their five dominant taxa (which account for >90% of all individuals) is structured so as to maximize resource partitioning. (Auth.)

B-47218
Caruso, C., **Amino acid sequence of the single hemoglobin of the high-Antarctic fish *Bathydraco marri* Norman,** *Comparative biochemistry and physiology,* Aug. 1992 102B(4), p.941-946, 21 refs.

Bathydraco marri Norman is a cold-adapted antarctic teleost (Family: Bathydraconidae), living preferably at depths between 400 and 1200 m. The blood of this species contains a single hemoglobin, in which oxygen binding is pH-regulated (Bohr and Root effects). The complete amino acid sequence of the alpha and beta chains of the hemoglobin of *B. marri* has been elucidated. (Auth.)

B-47219

Klöser, H., Plötz, J., **Morphological distinction between adult *Contracaecum radiatum* and *Contracaecum osculatum* (Nematoda, Anisakidae) from the Weddell seal *(Leptonychotes weddelli)*,** *Zoologica scripta,* Apr. 1992 21(2), p.129-132, 19 refs.

Morphological characters of the anisakid nematodes *Contracaecum radiatum* and *C. osculatum* from the Weddell Sea are reviewed. Both species occur in stomachs of seals in high southern latitudes. The investigation aims at providing some reliable criteria for quantitative routine light microscopy. Characters allowing a safe identification of the two species are: spicules and tail structures in males; lips, interlabia and collar in both sexes. Oesophageal shape and interlabial striation cannot be recommended for identification purposes. (Auth.)

B-47220

Dahms, H.U., **Peltidiidae (Copepoda, Harpacticoida) from the Weddell Sea (Antarctica),** *Zoologica scripta,* Apr. 1992 21(2), p.181-195, 12 refs.

Meiofauna was collected during expeditions with RV *Polarstern* along the Antarctic Peninsula and in the Weddell Sea. Two harpacticoid copepod species from two genera of the family Peltidiidae Sars, 1904 were found. *Alteutha polarsternae* sp.n. is described and *Eupelte villosa* (Brady, 1910) is redescribed in detail. The distribution of both these species in the Weddell Sea is recorded. (Auth. mod.)

B-47221

Massin, C., **Holothurians (Echinodermata) from Marion and Prince Edward Islands: new and little-known species,** *Zoologica scripta,* July 1992 21(3), p.311-324, Refs. 323-324.

Two new species, *Mesothuria edwardensis* sp.n. and *Paradota marionensis* sp.n., and the four little-known species *Cucumaria kerguelensis* Théel, 1886, *Cladodactyla crocea croceoides* (Vaney, 1908), *Psolidium incertum* (Théel, 1886) and *Synallactes challengeri* (Théel, 1886) of holothurians are described from Marion and Prince Edwards Is.

B-47223

Marquez, M.E.I., **Electrophoresis of soluble muscular proteins from krill on starch gel and IEF on agarose gel** [Electroforesis de las proteinas musculares solubles del krill antártico *(Euphausia superba)* sobre gel de almidón y enfoque isoeléctrico (IEF) en gel de agarosa], *Buenos Aires. Instituto Antártico Argentino. Contribución,* 1992 No.403, 23p., In Spanish with English and French summaries. 29 refs.

Proteinograms by electrophoresis on starch gel and isoelectric focusing (IEF) on agarose gel corresponding to muscular extracts of krill *(Euphausia superba)* were carried out. The relative mobilities of the different proteic fractions were determined and the quantitative evaluation of the same was carried out, dosing the proteinograms by densitometry. Qualitative and quantitative similarities were found in the electrophoretic profiles of the specimens analyzed. The results obtained permit considering the application of the methodology used for the typification of the species with biochemical criterion, and also for commercial use of species identification. (Auth.)

B-47260

Lipskaia, N.IA., Efremenko, V.N., Serebriakava, M.V., Kenzhin, B.A., **Nutrition of *Notolepis coatsi* (Paralepididae) in the pelagic zone of the Antarctic,** *Journal of ichthyology,* Aug. 1992 32(2), p.133-138, Translation of Voprosy ikhtiologii 31(4):693-696, 1991. 4 refs.

The ecology of Paralepididae has been poorly studied. *Notolepis coatsi* is one of the common species up to 500 m depth. No published information is available on the feeding of *N. coatsi* adults and young although it plays an important role in the food chain of the pelagic ecosystem of antarctic waters. *N. coatsi* reproduces at depths of 500-1000 m; the largest number of its prolarvae were found in the 500-750 m layer with a practically constant hydrological regime. With growth, the larvae rise to the subsurface layers, which have high productivity during the autumn-summer period. (Auth.)

B-47261

Pakhomov, E.A., Pankratov, S.A., **Feeding of juvenile notothenioid fishes of the Indian Ocean sector of the Antarctic,** *Journal of ichthyology,* June 1992 32(1), p.28-37, Translation of Voprosy ikhtiologii 31(4):664-671, 1991. 21 refs.

The present article contains information on the food composition of juvenile high-latitude fishes and also explains some aspects of their ecology. The materials were collected in Jan. 1978, Feb. 1981, and Jan.-Mar. 1986. Major collections were made near Enderby Land, and in Prydz Bay in aggregates of krill. The fish were selected from the catches of midwater trawls in the upper 100-150 m layer above the depths of 200-4500 m. The young fish fed on members of the mesozooplankton: copepods, euphausiids, and decapod larvae, chaetognaths, appendicularians, and small polychaetes, rarely macrozooplankton—euphausiids and juvenile fish. All the species investigated can be divided into two groups: group I includes species for which the copepod plankton is the main food—Arctic fingerfish, racovitzia, and trematom. Group II comprises species whose young feed upon euphausiids and to a lesser extent juvenile fish: antarctic toothfish, Wilson's glassfish, and hamatus. The food spectrum of group I juvenile fish is broader than that of group II, which is related to the difference in the number of species of their main food: more than ten copepod species compared to three euphausiids. It is concluded that juvenile notothenioids mainly consume copepod plankton at the early stages of ontogeny, while juvenile Channichthiids feed on euphausiid and fish larvae. The members of these families have different types of reproductive biology, expressed as different maturation rates, spawning periods, fecundity, egg size, and, consequently, duration of incubation period.

B-47262

Efremenko, V.N., **Ichthyoplankton studies in the Lazarev Sea,** *Journal of ichthyology,* Sep. 1992 31(5), p.129-133, Translation of Voprosy ikhtiologii 31(5):873-876, 1991. 19 refs.

The composition of ichthyoplankton in the Lazarev Sea and its distribution during the summer period are examined. The material was collected during the 19th cruise of the NIS *Akademik Knipovich* in Mar. 1981. Sampling and analyses of the samples were conducted according to standard methods. As capture gear, a Bogorov-Rass ichthyoplankton net (BR 80x113) was used. A portion of the material was obtained from plankton samples taken at the same stations by a smaller Juday net. Larvae juveniles and juveniles were taken from the catches of pelagic trawls. Taking into account the hydrological features of the antarctic high-latitude waters and, most of all, the vertical structure of the water mass, the ichthyoplankton catches with the BR net were conducted at the following layers: 1000-500, 500-200, 200-100, 100-50, and 50-0 m. In all, 86 stations were sampled, and 550 samples were collected. (Auth. mod.)

B-47263
Bost, C.A., Jouventin, P., Pincson du Sel, N., **Morphometric variability on a microgeographical scale in two inshore seabirds,** *Journal of zoology,* Jan. 1992 226(1), p.135-149, 60 refs.

The range of morphometric variation among two inshore seabirds, the Kerguelen cormorant and the gentoo penguin was investigated on the Kerguelen and Crozet archipelagos. Four measurements (weight, culmen, flipper and body length for gentoos; weight, culmen, wing and tarsus length for cormorants) were compared in the same seven localities on Kerguelen. In addition, culmen and wing length were compared in four localities on Crozet for gentoo penguins. The two species exhibited similar trends in variation within Kerguelen, although the range of variation was greater in cormorants. Compared to the largest cormorants and gentoo of Kerguelen, the smallest stocks were 60 and 36% of the weights, respectively. There is little evidence elsewhere of similar broad morphometric variability in seabirds on a microgeographical scale. The variation observed did not follow a regular cline and appeared to be less related to physical factors (sea temperatures) than to the local biological factors during the breeding season. (Auth.)

B-47265
Groscolas, R., Cherel, Y., **How to molt while fasting in the cold: the metabolic and hormonal adaptations of Emperor and King penguins,** *Ornis scandinavica,* Jul.-Sep. 1992 23(3), Symposium on Hormones, Physiology and Nonreproductive Behavior in Birds, Aug. 1991, Göteborg, Sweden. Proceedings. Edited by B. Silverin and A. Enemar, p.328-334, 25 refs.

Like other penguin species, molting Emperor and King penguins remain ashore and fast for several weeks during which their entire plumage is simultaneously renewed. Molt therefore involves the use of endogenous lipid reserves and body protein to meet the nutrient requirements not only for new feather synthesis, but also for the increase in energy expenditure associated with the decrease in thermal insulation. This energetic and metabolic stress results in a 45% decrease in body mass and in a 50% loss of body protein. There is no evidence that metabolic hormones such as glucagon, insulin and corticosterone play a major role in the control of metabolic events specifically related to molt. In contrast, the marked increase in circulating thyroxine at the onset of new feather synthesis in adult Emperor and King penguins, and in Emperor Penguin chicks, suggests that this hormone triggers molt by stimulating the development of the new plumage. On the other hand, triiodothyronine could intervene in the control of energy metabolism in situations of acute cold exposure, as during the loss of old feathers in the antarctic adult Emperor Penguins. (Auth.)

B-47267
Robisson, P., **Vocalizations in *Aptenodytes* Penguins: application of the two-voice theory,** *Auk,* July 1992 109(3), p.654-658, 32 refs.

The results of sonagram studies of nesting behavior among King and Emperor Penguins are presented. These two species do not build nests for their eggs but incubate them on their feet with both partners sharing the duty. Vocalizations are the sole means the birds have for locating a partner in a colony, however large it may be. Both sexes produce a unique mutual display call which facilitates locating an incubating partner. The unique calls are composed of syllables separated by amplitude declines; in King Penguins the declines coincide with frequency drops, while in Emperors the drops appear as silences on the sonagrams. Details of sonagram records are given.

B-47290
Hunt, G.L., Jr., Heinemann, D., Everson, I., **Distributions and predator-prey interactions of macaroni penguins, antarctic fur seals, and antarctic krill near Bird Island, South Georgia,** *Marine ecology progress series,* Sep. 1992 86(1), p.15-30, 68 refs.

Studies are reported on the distributions, abundances and interactions of macaroni penguins, antarctic fur seals and their zooplankton prey, in particular antarctic krill, near Bird I., South Georgia, in Feb. 1986. Simultaneous surveys of marine birds, antarctic fur seals and antarctic krill were conducted along a series of transects radiating from the breeding colonies of the vertebrate predators. Relationships were examined between the distributions of predators and their prey with respect to the abundance of krill in the water column and marine habitats near the colonies. Antarctic fur seals and macaroni penguins showed positive correlations with antarctic krill density across a wide range of spatial scales. Because krill was abundant close to the colony and predator densities decreased with distance due to geometry, distance from colony was a confounding variable. When the influences of distance and direction on predator abundance were factored out, it was possible to demonstrate an additional influence of antarctic krill abundance at measurement scales between 10 and 100 km for antarctic fur seals and for macaroni penguins at the scale of 70 to 100 km. Water depth was an important correlate of antarctic krill and antarctic fur seal abundances but not of the abundance of macaroni penguins. No evidence was found that the fur seals or macaroni penguins were concentrating their foraging for krill in the vicinity of the shelf-break. (Auth.)

B-47291
Moore, P.J., **Breeding biology of the yellow-eyed penguin *Megadyptes antipodes* on Campbell Island,** *Emu,* Sep. 1992 92(3), p.157-162, 26 refs.

Forty-two nests of yellow-eyed penguins were dispersed in an 11 ha area of Middle Bay, Campbell I., during the 1987-88 breeding season. Eighty-three percent of eggs hatched. The mean hatch date was Nov. 26, 9 days later than that recorded on the South I. of New Zealand. Eighty-five percent of chicks fledged at a rate of 1.4 chicks per nest. This level of success was comparable to that found during good seasons on South I., or in areas where predation levels on chicks is low. Chicks fledged at a mean weight of 5.1 kg, 108 days after hatching. (Auth.)

B-47294
Stenroos, S., Ahti, T., **Lichen family Cladoniaceae in the Falkland Islands,** *Annales botanici Fennici,* 1992 29(1), p.67-73, 31 refs.

Twenty-eight species of lichens of the family Cladoniaceae are reported from the Falkland Is. Twelve species and one subspecies are new records for the area. The new species *Cladonia anserina* Ahti is described. New reports on chemistry include thamnolic acid in *C. luteoalba* Wheldon & A. Wilson and isousnic acid in *C. subchordalis* A. Evans. The taxa include 59% of bipolar elements, while 41% are austral in distribution. (Auth.)

B-47298
Wartzok, D., **Acoustic tracking system for monitoring under-ice movements of polar seals,** *Acoustical Society of America. Journal,* Aug. 1992 92(2)pt.1, p.682-687, 15 refs.

An acoustic tracking system is described that has been used to track Weddell seals in Antarctica and ringed and spotted seals in the Arctic. The seals are released with a small depth-modulated acoustic transmitter attached. They are tracked in real time based on the time difference of arrival at four hydrophones of the pulse from the acoustic transmitter. Working ranges are approximately those predicted by acoustic equations. Closed-form solutions of the tracking algorithm allow rapid calculation of position. The effect of different array geometries on accuracy of tracking is explored analytically. (Auth.)

B-47312
Miller, D.G.M., **Exploitation of antarctic marine living resources: a brief history and possible approach to managing the krill fishery,** *South African journal of marine science,* 1991 No.10, p.321-339, Refs. p.337-339.
DLC SH315.S7S59b

Four major phases in the exploitation of antarctic marine living resources are identified and briefly described, viz. exploitation of seals, whales, finfish and krill *Euphausia superba* Dana. The pattern of exploitation has shifted from one group of resources to another. The recent efforts of the Commission for the Conservation of Antarctic Marine Living Resources are considered in relation to management of finfish exploitation and to the development of a scientifically based management plan for krill. Special emphasis is given to the data required for the effective management of the krill fishery, given the current limited knowledge of the potential yield of the resource and in the face of uncertainty concerning key aspects of the species' biology/ecology. A recent South African initiative aimed at developing a practical management strategy for the antarctic krill resource is described. (Auth.)

B-47315
Favero, M., Silva, M.P., **Status of the breeding birds at Half Moon Island (isla Media Luna), South Shetland Islands, Antarctica,** *Buenos Aires. Instituto Antârtico Argentino. Contribución,* 1991 No.407, 8p., 8 refs.

The potentially detrimental effects on local breeding populations of some species of seabirds, from activities associated with field stations and visits by tourists, are discussed. At Half Moon I., where the Argentinian Cámara Base was reopened after an interval of 10 years and tourists are becoming a regular summer feature, the breeding populations of 7 seabird species were counted on Jan. 27-30, 1991, to provide current baseline data for future assessments of the effects of the new circumstances. Data on each of the breeding species counted—Chinstrap Penguin, Wilson's Storm Petrel, Blue-eyed Shag, Subantarctic Skua, Greater Sheathbill, Kelp Gull, and Antarctic Tern—and a detailed map of their breeding sites are provided; the counts are compared to limited previous data. The survey was made during the incubation period of the Wilson's Storm Petrel and Subantarctic Skua, and during the brooding period of the other species.

B-47318
Davey, M.C., Pickup, J., Block, W., **Temperature variation and its biological significance in fellfield habitats on a maritime antarctic island,** *Antarctic science,* Dec. 1992 4(4), p.383-388, 21 refs.

Temperatures within soil and plant habitats on Signy I. in the maritime Antarctic were measured during 1987. Four sites were monitored using minithermistors attached to a data logging system. Three main periods within the annual temperature cycle were identified. In spring/summer (Nov.-Mar.) there was much inter-day variation in maximum temperatures, but minimum daily temperatures were always close to 0 C. However, there were very few freeze-thaw cycles extending below the -0.5 C threshold during this period, and those that occurred were not severe. It is considered that freeze-thaw cycling is unlikely to be a significant factor in organism survival during summer. All sites showed a long period of relatively mild subzero temperatures during autumn (Mar.- May). This may be of importance in promoting cold-hardiness of organisms living in these ecosystems before the decline to lower winter temperatures. Minimum winter temperatures varied markedly between sites; lowest temperatures occurred in areas where there was little insulating snow cover. Within-site temperature variation was generally small, confirming the validity of the use of small numbers of probes to monitor environmental temperatures in such habitats. (Auth.)

B-47319
Everson, I., Neelov, A., Permitin, IU.E., **Bycatch of fish in the South Atlantic krill fishery,** *Antarctic science,* Dec. 1992 4(4), p.389-392, 11 refs.

Icefish *(Champsocephalus)* were taken as bycatch during krill fishing operations from a research vessel. The data indicate that the bycatch of fish in the commercial krill fishery may be significant in some areas of the South Georgia shelf. The problem is thought to be least in open ocean krill fishing. (Auth.)

B-47320
McConnell, B.J., Chambers, C., Fedak, M.A., **Foraging ecology of southern elephant seals in relation to the bathymetry and productivity of the southern ocean,** *Antarctic science,* Dec. 1992 4(4), p.393-398, Refs. p.397-398.

Southern elephant seals *(Mirounga leonina)* are among the most proficient of mammalian divers, and are a major component of the antarctic food web. Yet little is known of their movements or interaction with their oceanic environment. Specially designed satellite-link data loggers allowed the authors to visualize the 3-D movements of elephant seals as they swam rapidly from South Georgia to distant (up to 2650 km) areas of antarctic continental shelf. One seal dived continuously to the sea bed in one small area for a month, implying consumption of benthic prey. Dives here were shorter even though average swimming velocity was lower. It is suggested that the physiological requirements of feeding and digestion reduced the aerobic dive limit. Long distance travel to relocatable hydrographic or topographical features, such as shelf breaks, may allow large predators to locate prey more consistently than from mid-ocean searches. (Auth.)

B-47321
Melick, D.R., Seppelt, R.D., **Loss of soluble carbohydrates and changes in freezing point of antarctic bryophytes after leaching and repeated freeze-thaw cycles,** *Antarctic science,* Dec. 1992 4(4), p.399-404, 26 refs.

Healthy samples of *Grimmia antarctici, Ceratodon purpureus, Bryum pseudotriquetrum* and *Cephaloziella exiliflora* were collected in late summer in Wilkes Land together with senescing and dead *G. antarctici* material. Plant material was subjected to leaching in water and up to 16 freeze- thaw cycles. Gas chromatography revealed that following 16 days immersion, loss of carbohydrates was relatively low for healthy material, with a loss of 69% from the dead *G. antarctici* material. Freeze-thaw cycles greatly increased rates of sucrose leakage and led to 2-3 times rise in total sugar loss in all samples except the dead brown tissue, which was not significantly different from the leached control treatment. After 16 freeze-thaw cycles *B. pseudotriquetrum* had lost 65% of total sugar pool. Losses for other species were below 28%. Differential thermal analyses showed freezing points of tissue varied from -8.3 to -3.5 C with dead material having the highest freezing temperatures. There was no significant correlation within species of freezing temperature changes with progressive sugar loss. The results are discussed in relation to nutrient cycling, soil microbial activity and the viability of bryophyte species in the antarctic environment. (Auth.)

B-47322
North, A.W., Murray, A.W.A., **Abundance and diurnal vertical distribution of fish larvae in early spring and summer in a fjord at South Georgia,** *Antarctic science,* Dec. 1992 4(4), p.405-412, 22 refs.

The diurnal vertical distribution and abundance of fish larvae was studied by net samples in the 265 m deep fjord of Cumberland East Bay, South Georgia. In early spring the six most abundant species of fish larvae in the upper 200 m of the water column were *Champsocephalus gunnari, Lepidonotothen nudifrons, Pseudochaenichthys georgianus, Chaenocephalus aceratus, Parachaenichthys georgianus* and *Electrona antarctica.* In summer, the larvae of *C. gunnari, Gobionotothen gibberifrons, Lepidonotothen larseni* and *Trematomus hansoni* were most abundant, and the majority were found in the upper 140 m of the water column, with greatest densities in the top 2 m. During both seasons most species showed some evidence of diurnal vertical migration. A distinct pattern was found for *C. gunnari* in summer; they were at 0-20 m during the day and 60-100 m at midnight. Net avoidance by the larvae of most species was greater before sunset in early spring, and during all periods of daylight in summer, than at other times of day. (Auth.)

B-47323
Roser, D.J., Melick, D.R., Ling, H.U., Seppelt, R.D., **Polyol and sugar content of terrestrial plants from continental Antarctica,** *Antarctic science,* Dec. 1992 4(4), p.413-420, 39 refs.

Ethanol extractable polyols and sugars from the dominant cryptogams of the Windmill Is. were characterized and quantified by gas liquid chromatography. Arabitol, ribitol and mannitol were the major low molecular weight carbohydrates extracted from all 8 species of lichen analyzed. Extracts of 4 common bryophyte species were dominated by sucrose, glucose and fructose; little polyhydric alcohol was detected except in the liverwort *Cephaloziella exiliflora* which contained a substantial proportion of mannitol. Total carbohydrate levels in the bryophytes (9-60 mg/g dry weight) were comparable to those in lichens. The compositions of 8 species of algae varied considerably. *Prasiola crispa, Desmococcus vulgaris* and *Schizogonium murale* possessed sorbitol as their main constituent and had extractable carbohydrate contents comparable to those found in bryophytes on a dry weight or chlorophyll *a* content basis. The one snow alga with comparable carbohydrate levels, *Mesotaenium berggrenii,* contained sucrose, glucose, glycerol and a number of unidentified compounds. The remaining four species *(Oscillatoria* sp., *Chloromonas* sp. 1, *Chlorosarcina* sp. 2 and *Chlamydomonas pseudopulsatilla)* did not accumulate comparable levels of sugars and polyols. (Auth. mod.)

B-47324
White, M.G., Burren, P.J., **Reproduction and larval growth of *Harpagifer antarcticus* Nybelin (Pisces, Notothenioidei),** *Antarctic science,* Dec. 1992 4(4), p.421-430, Refs. p.429-430.

The spiny plunder-fish, *Harpagifer antarcticus,* is a common shallow-water demersal species distributed along the southern limb of the Scotia Arc. A year round study was made of its reproductive biology at Signy I. for comparison with populations from the Antarctic Peninsula and with *H. georgianus* at South Georgia. Adult *H. antarcticus* inhabit rubble substrata and spawn 300-1500 eggs into a nest during May- July. The nest is guarded by both male and female fish during an incubation period of up to 150 days. After hatching during Nov.-Dec. the larvae grow at a rate of 0.082 mm/d (summer), 0.049 mm/d (winter) and 0.067 mm/d (annual), calculated from a time-series of samples collected from the field. This rate of growth is slow even among antarctic species, but is similar to the closely related species *H. georgianus.* Adult male and female *H. antarcticus* at the South Orkney Is. attain a maximum standard length of 88 mm and 85 mm respectively. (Auth.)

B-47325
Stephenson, S.L., Seppelt, R.D., Laursen, G.A., **First record of a myxomycete from subantarctic Macquarie Island,** *Antarctic science,* Dec. 1992 4(4), p.431-432, 9 refs.

In Dec. 1979 an unidentified myxomycete was collected on Macquarie I. The specimen was later identified as *Lamproderma ovoideum* Meylan, a species not previously known from either Macquarie I. or the entire south polar region. The collection of *L. ovoideum* from Macquarie I. consists of c. 35 sporangia which developed on shoots of a liverwort, *(Lepidozia* sp.). It was collected from a damp undercut bank of a steep coastal slope near the ocean. The collection site is located at an elevation of about 4 m and it would never, or rarely, be expected to receive direct snow deposition. However, *L. ovoideum* belongs to the distinct ecological group of myxomycetes referred to as "snow melt" or "snowbank" myxomycetes.

B-47326
Prince, P.A., Jones, M., **Maximum dive depths attained by South Georgia diving petrel *Pelecanoides georgicus* at Bird Island, South Georgia,** *Antarctic science,* Dec. 1992 4(4), p.433-434, 16 refs.

The most proficient divers of the order Procellariiformes are likely to be the diving petrels in the family Pelecanoididae. Although the diet of some species has been studied, their diving performance and foraging ecology are unknown. This paper reports the first data on maximum depths attained by South Georgia diving petrels *P. georgicus* (weighing less than 100 g) while engaged in rearing chicks. This is the smallest sea- bird whose diving performance has been investigated.

B-47333
Watson, L., **Sea guide to whales of the world,** New York, E.P. Dutton, 1981, 302p., Bibliography p.285-297.
DLC QL737.C4W36 1981

Much of the material in this book deals with areas other than the Antarctic. However, there are numerous references to whale species which live in or pass through antarctic waters at various times. This is a celebration of cetaceans, the first complete survey of all the world's living whales, dolphins and porpoises, dealing with the whole animals, touching on internal structures only insofar as these affect behavior or offer assistance in identification. The accounts of each species include a summary of all known information on its appearance, distribution and habits in the wild, much of it published here for the first time. Original observations are offered hoping that these may prove useful to others faced with the problem of identifying a dolphin by the flash of its fin, or a whale from nothing more than the afterimage of its last lungful of air before a dive. A linking key to classification is included which makes it possible for any novice, using a few simple characteristics, to identify an animal at sea or cast up on the shore. This may prove useful to many who come into fleeting contact with whales or dolphins and want to know more about them. Also included are some general notes, concentrating still on visible features and observable patterns of behavior, which shed light on the origin and evolution of these fascinating mammals that chose to go back to their source in the sea.

B-47334
Bornemann, H., Mohr, E., Plötz, J., **Monitoring the feeding behavior of free diving Weddell seals** [Registierung des Fressverhaltens beim frei beweglichen Tier am Beispiel der freiauchenden Weddellrobbe *(Leptonychotes Weddellii)*], *Zentralblatt für Veterinarmedizin. Reihe A. Journal of veterinary medicine. Series A,* 1992 39A(3), p.228-235, In German with English and German summaries. 16 refs.

During the antarctic summer 1990, the pattern of food intake in comparison to diving activity was investigated on adult Weddell seals.

Diving depths were recorded by a time-depth recorder (TDR). The TDR is a free programmable electronic datalogger which can store data on up to 5 channels. It was fixed on the fur of the seal, ensuring that no long lasting irritation of the animal was caused. The pattern of food intake was monitored by measuring the jaw movements, using strain gauges for recording the deformation of the muscles by mastication. After electronic amplification and filtering, the frequency of jaw activity within a measuring period was recorded on one channel of the TDR. By simultaneously observing the diving depths, these data may lead to conclusions about chewing patterns of the seal in water depths where they catch prey. The graph of these data and the mathematical evaluation by Fourier analysis and Plexogramme show a close correlation between diving depth and jaw activity. (Auth.)

B-47336
Ancel, A., **Foraging behaviour of emperor penguins as a resource detector in winter and summer,** *Nature,* Nov. 26, 1992 360(6402), p.336-339, 8 refs.

The emperor penguin, which feeds only at sea, is restricted to the higher latitudes of the antarctic sea-ice habitat. It breeds on the winter fast ice when temperatures are -30 C and high winds are frequent. Assuming entirely the task of incubating the single egg, the male fasts for about 120 days in the most severe conditions. When it is relieved by the female around hatching time, the distance between the colony and the open sea may be 100 km or more, but where emperors go to forage at that time or during the summer is unknown. Polynyas are areas of open water in sea ice and during winter, with the under-ice habitats at any time of the year, they are among the most difficult of all antarctic areas to sample. The routes taken by emperor penguins for foraging were monitored by satellite and compared with satellite images of sea-ice. Winter birds walking over fast ice travelled up to 296 km to feed in polynyas, whereas those swimming in light pack-ice travelled as far as 895 km from the breeding colony. One record of diving showed that although most dives are to mid-water depths, some are near the bottom. Obtaining such detailed information on foraging in emperor penguins means that this bird now offers a unique opportunity to investigate the antarctic sea-ice habitat. (Auth.)

B-47337
Axelsson, M., Davison, W., Forster, M.E., Farrell, A.P., **Cardiovascular responses of the red-blooded antarctic fishes *Pagothenia bernacchii* and *P. borchgrevinki*,** *Journal of experimental biology,* June 1992 Vol.167, p.179-201, 45 refs.

The aim of this study was to investigate cardiac performance and cardiovascular control in two red-blooded nototheniid species of antarctic fishes, *Pagothenia bernacchii* (a benthic fish) and *P. borchgrevinki* (a cryopelagic fish), and to make comparisons with existing information on haemoglobin-free antarctic teleosts. Details of cardiovascular responses in both fish during active and resting modes, and following various chemical and environmental exposures and variations, are given in terms of ventral aortic pressure, cardiac output, heartrate, and stroke volume. Similarities exist between these two red-blooded antarctic teleosts and haemoglobin-free channichthyids. These include a low *P*VA, associated with a low vascular resistance, and a high cardiac stroke volume. Ventricle mass is somewhat larger than in temperate species of teleosts, especially considering the low aortic pressures developed by the heart. The absence of a sustained bradycardia in *P. bernacchii* during hypoxia or an adrenaline-induced increase in *P*VA is unusual. This may in part reflect the very high inhibitory cholinergic tone to the heart, the highest value found in resting fish. (Auth. mod.)

B-47344
Watanuki, Y., Naito, Y., **Counting Adélie penguins at colonies: seasonal and annual changes,** *Antarctic record,* July 1992 36(2), p.279-284, In Japanese with English summary. 16 refs.

The number of Adélie penguin *(Pygoscelis adeliae)* adults at colonies around Showa Station changes seasonally. The penguins begin to arrive on Oct. 20-25. The number of adults at each colony reaches its maximum on Nov. 10-20, decreasing by late Nov. and stabilizing on Dec. 1-10. This seasonal pattern was consistent through different years and colonies. Census in mid-Nov. and early Dec. is recommended since it provides reliable numbers for breeding pairs. (Auth.)

B-47345
Nakatsubo, T., Ohtani, S., **Note on the structure of moss colonies composed of two species on King George Island, the South Shetland Islands,** *Antarctic record,* July 1992 36(2), p.285-293, 8 refs.

Moss colonies composed of two species, *Sanionia uncinata* and *Bryum pseudotriquetrum,* are abundant in the vicinity of the Great Wall Station on King George I. Vertical cross-sections of these colonies were examined to determine the colony structure indicating the interaction between the two species. In several colonies, a layer composed of *B. pseudotriquetrum* was partially covered with shoots of *S. uncinata* (pattern 1). In some other colonies, a layer composed of *S. uncinata* was partially covered with shoots of *B. pseudotriquetrum* (pattern 2). For the rest of the colonies, both species coexisted without covering each other (pattern 3). It is concluded that the proportion of the two species in a colony has changed through the colony growth, but the direction of the change varies among the colonies at each site. (Auth.)

B-47365
Prezant, R.S., Showers, M., Winstead, R.L., Cleveland, C., **Reproductive ecology of the antarctic bivalve *Lissarca notorcadensis* (Philobryidae),** *American Malacological Society,* 1992 9(2), AMU/SM Symposium on marine bivalves, Berkeley, CA, July 1991, p.173-186, 39 refs.

The reproductive ecology of museum deposited specimens of the small philobryid antarctic bivalve *Lissarca notorcadensis* was examined. Common to southern polar waters, the philobryids are typically epifaunal in habitat. *L. notorcadensis,* collected from sites adjacent to the Antarctic Peninsula, are found frequently attached bysally to cidaroid echinoid spines. While 95% of all mature clams display either ova or sperm, there is a quantitative shift in populations examined from male to female dominance with some indications of protandry. *L. notorcadensis* are synchronous pallial brooders producing 9-15 shelled offspring regardless of adult female size. Juveniles that have already produced dissoconch shell apparently crawl from the parental infrabranchial chamber directly onto the same spine as their parent. The newly released juveniles lack fully developed digestive diverticula, but are sustained by residual yolk reserves. Possible adaptations for brooding in the adult include an absence of the anterior adductor muscle, thereby increasing pallial volume, and filibranch ctenidia that allow compact brood development. It is suspected that these iteroparous bivalves release their broods in late austral winter to early summer. A single distinct collection from a site close to South Georgia reflects differences between zoogeographic areas. (Auth.)

B-47368
Brandt, A., **Redescription of the deep-sea Asellote isopod *Mesosignum antarcticum* Schultz, 1979 (Isopoda, Asellota, Mesosignidae),** *Zoologischer Anzeiger,* 1991 227(3/4), p.229-239, 19 refs.

Mesosignum antarcticum Schultz, 1979 is redescribed. It was collected by RV *Polarstern* close to the Gunnerus Ridge, Antarctica. This is the second record of this species in the southern ocean. A key to all species of *Mesosignum* is also presented and some remarks on its biogeography are given. (Auth.)

B-47373
Detrich, H.W., III, Fitzgerald. T.J., Dinsmore, J.H., Marchese-Ragona, S.P., **Brain and egg tubulins from antarctic fishes are functionally and structurally distinct,** *Journal of biological chemistry,* Sep. 15, 1992 267(26), p.18,766-18,775, 58 refs.

The multitubulin hypothesis proposes that chemically distinct tubulins may possess different polymerization properties or may form functionally different microtubules. To test this hypothesis, the functional properties and the structures of singlet-specific nonneural and neural tubulins from antarctic fishes were examined. Tubulins were purified from eggs of *Notothenia coriiceps neglecta,* and from brain tissues of *N. coriiceps neglecta* or *N. gibberifrons,* by DEAE ion-exchange chromatography and cycles of microtubule assembly/disassembly. Polymerization of both tubulins was entropically driven, but the apparent standard enthalpy and entropy changes for microtubule elongation by egg tubulin were significantly greater than values observed for brain tubulin. Egg tubulin was composed of approximately six *alpha* and two *beta* chains and lacked the *beta*III isotype, whereas brain tubulin was more complex. Furthermore, egg *alpha* tubulins from the antarctic fishes are functionally distinct *in vitro,* due either to qualitative or quantitative differences in isotypic composition, to differential posttranslational modification of shared isotypes, or to both. (Auth. mod.)

See also:
A-46053 C-46579 D-46057 D-46763 E-45152 E-45223 E-45229
E-45269 E-45328 E-45329 E-45839 E-45840 E-45857 E-45858
E-46034 E-46135 E-46348 E-46349 E-46350 E-46369 E-46372
E-46604 E-46723 E-46808 E-46888 E-46955 E-47012 E-47058
E-47129 E-47236 E-47237 E-47289 E-47299 E-47317 F-45358
F-46376 G-45955 H-45872 H-47300 I-45603 I-45604 I-45980
I-46093 I-46428 I-46622 I-46680 I-46834 I-46983 J-45156
J-45319 J-45370 J-45407 J-45595 J-45730 J-45925 J-45948
J-45997 J-46003 J-46017 J-46019 J-46071 J-46100 J-46144
J-46165 J-46224 J-46235 J-46236 J-46237 J-46238 J-46243
J-46244 J-46245 J-46250 J-46261 J-46275 J-46286 J-46287
J-46288 J-46289 J-46298 J-46301 J-46378 J-46383 J-46384
J-46583 J-46804 J-46866 J-46938 J-47039 J-47057 J-47114
J-47119 J-47217 J-47335 M-46097 M-46737 M-47255
M-47256 M-47257 M-47258 M-47259 M-47295 M-47296

C. CARTOGRAPHY

C-45078
Foster, J.L., Hall, D.K., **Observations of snow and ice features during the polar winter using moonlight as a source of illumination,** *Remote sensing of environment,* Aug. 1991 37(2), p.77-88, 23 refs.

Sunlight reflected off the surface of the moon provides sufficient illumination for nighttime imaging of the earth from those spacecraft on which the instruments are sensitive to low light levels. The Defense Meteorological Satellite Program (DMSP) series of satellites are at present the only systems capable of furnishing visible nocturnal images of the earth from space. Features having a high albedo in the visible wavelengths, such as snow and ice, can easily be identified on moonlit nights when the moon is in the gibbous or full phases. Little information exists about the distribution of leads, fractures, and polynyas on a basin-wide scale in the winter pack ice, and knowledge of oceanic and atmospheric fluxes is hindered by the limited data available in winter. The DMSP data is a relatively untapped source for observing polar regions during the winter. Nighttime imagery provides a novel way to explore polar areas during the winter months when the sun is below the horizon for much of the time. Examples of both arctic and antarctic imagery are presented and discussed. (Auth. mod.)

C-45118
Brunini, C., **Geodesic linking between Antarctica and Tierra del Fuego** [Vinculación geodésica entre Antartida y Tierra del Fuego], Actas de la Primera Conferencia Latinoamericana sobre Geofísica, Geodesia e Investigación Espacial Antárticas. (First Latin American Conference on Antarctic Geophysics, Geodesy and Space Research, Buenos Aires, July 30-Aug. 3, 1990. Proceedings.) Edited by A. Louro, M.A. Van Zele, and I. Velasco, [Buenos Aires, Centro Latinoamericano de Física, 1990], p.45-50, In Spanish. 4 refs.

A joint project between Argentina and Spain is described, involving the continuation of geodetic surveys carried out at Juan Carlos I Station since 1987. The geodetic network established at various points of the Shetland Is. by the Spanish team was linked to the Argentine national geodetic network with stations at the southern tip of that country. The new network covers the area between the extreme south of the American continent and the Antarctic Peninsula, including the South Atlantic islands. The methodology and equipment used are discussed, and the preliminary results presented include data on absolute and relative positioning, with typical internal deviations, and 2 maps.

C-45124
Skvarca, P., Soto, J.R., Keller, M.A., Diaz, M.T., **Doppler positioning on the Antarctic Peninsula** [Posicionamiento satelital Doppler en la peninsula Antartica], Actas de la Primera Conferencia Latinoamericana sobre Geofísica, Geodesia e Investigación Espacial Antárticas. (First Latin American Conference on Antarctic Geophysics, Geodesy and Space Research, Buenos Aires, July 30-Aug. 3, 1990. Proceedings.) Edited by A. Louro, M.A. Van Zele, and I. Velasco, [Buenos Aires, Centro Latinoamericano de Física, 1990], p.99-108, In Spanish. 10 refs.

In Oct. and Nov. of 1988, the Instituto Antártico Argentino and the Servicio de Hidrografía Naval jointly carried out the project of Doppler positioning on the Antarctic Peninsula. The satellite receivers and the data processing method used are described. The results are discussed and presented in tables and charts, showing precise values of absolute gravity acceleration and the mean sea level at various Argentine antarctic coastal stations.

C-45145
Catalan, M., **Spanish-Argentine antarctic geodynamic GPS network project,** Actas de la Primera Conferencia Latinoamericana sobre Geofísica, Geodesia e Investigación Espacial Antárticas. (First Latin American Conference on Antarctic Geophysics, Geodesy and Space Research, Buenos Aires, July 30-Aug. 3, 1990. Proceedings.) Edited by A. Louro, M.A. Van Zele, and I. Velasco, [Buenos Aires, Centro Latinoamericano de Física, 1990], p.330-336, 3 refs.

During the 1987-1988, 1988-1989 and 1989-1990 summers, a Spanish-Argentine geodetic-geodynamic antarctic project established and measured a high precision geodetic GPS network, linking the South Shetland Is., the Antarctic Peninsula and South America. The benchmarks, the geometry of the network, the hardware and software used, as well as systematic future measurements, will permit the use of the network for geodynamics studies.

C-45150
Cisak, J., Dabrowski, S., **Polish geodetic and cartographic studies in the arctic and antarctic regions,** *Polish polar research,* 1990 11(3-4), p.411-417, 7 refs.

Permanent renewal of measurements of phenomena occurring on the Earth surface—the main task of geodesy and cartography—is the important element of geodynamic studies of the arctic and antarctic regions. The Institute of Geodesy and Cartography has participated in the program of research led by the Polish Academy of Sciences for over 10 years, using conventional geodetic methods, as well as new types of data acquired from satellite observations and through remote sensing techniques. This activity is evidenced by setting up astronomical main points close to Hornsund Station in 1958, as well as at Arctowski Station in 1976, where cyclic astronomical and satellite measurements were performed. A geodynamic test site was organized in the Hornsund Region. As a result of these works numerous topographic and thematic maps were produced and many scientific publications were prepared by Institute specialists. (Auth.)

C-45197
Elliot, D.H., ed, Strange, W., ed, Whillans, I.M., ed, **GPS in Antarctica. Report of a workshop: Utilization of the Global Positioning System (GPS) in addressing scientific problems in Antarctica,** *Byrd Polar Research Center. Technical report,* 1991 BPRC TR 91-02, 37p.

A meeting was held in Mar. 1991, at Ohio State University to discuss the future of the use of the Global Positioning System (GPS) in Antarctica. The first topic for consideration in GPS work is the security and stability of the reference, or fiducial, network. This network is already being developed; two field campaigns have recently been completed that seek to tie McMurdo Station into reference stations in Australia and New Zealand and the rest of the world, as well as to other reference sites around Antarctica. Very Long Baseline Interferometer (VLBI) and Satellite Laser Ranging (SLR) currently provide the worldwide fiducial network. It is extremely important to connect Antarctica to the global VLBI reference frame. VLBI stations are planned for Showa, O'Higgins, and McMurdo. The participants in the workshop strongly endorse the efforts to provide a strong reference frame for Antarctica. Discussions also centered on the best methods for conducting GPS campaigns. It was decided that no central planning was needed except for the installation and long-term operation and maintenance of fiducial stations and the need for documentation of the fiducial sites. Each investigator should be responsible for contacting the operators of fiducial stations, and operating their own networks designed to address specific scientific problems.

C-45267

Battke, Z., Cisak, J., Dobrzycka, M., **Geodetic works performed during the 12th summer expedition to the H. Arctowski Polish Antarctic Station** [Prace geodezyjne wykonane w czasie XII rejsowej wyprawy do stacji im. Henryka Arctowskiego w Antarktyce], *Warsaw. Institute of Geodesy and Cartography. Proceedings,* 1989 36(1-2), p.111-122, In Polish with English and Russian summaries. 2 refs.

This article describes work performed during the 12th Polish polar expedition to Arctowski Station in Jan. 1988. The main aim of this expedition was to perform Doppler observations within the INTERCOSMOS campaign with the use of the Polish DOG-3 receiver. The following coordinates of the geodetical main point, located at the station, were determined on the basis of 311 passes accepted by the GEODOP V program: phi=-62 deg 09 min 41 sec,56; lambda=301 deg 31 min 49 sec,99 and H=30.60 m. An original sketch of a topographic map for the site protected area (SPA), located close to the Lions Rump peninsula at King George Bay, has been prepared, and certain geodetical measurements for different scientific groups working at the station were performed. (Auth. mod.)

C-45705

Bianchi, R., **Image processing techniques applied to LANDSAT MSS images of Victoria Land, Antarctica,** *Società Geologica Italiana, Rome. Memorie,* 1988 Vol.43, Meeting on Earth Science in Antarctica, Siena, Sep. 27-28, 1988. Proceedings, p.155-163, With Italian summary. 10 refs.

Preliminary results are presented of research focusing on the production of antarctic image maps in cartographic projection to be used for photointerpretation and for the compilation of thematic maps. To achieve this it was necessary to remove radiometric noise and to correct geometric distortions. Enhancement techniques were applied to the LANDSAT data in order to extract specific information. Examples of the results that can be obtained by the application of these image processing techniques to LANDSAT MSS imagery of Antarctica are also shown. (Auth.)

C-45799

Borfecchia, F., Frezzotti, M., **Satellite image mosaic of the Terra Nova Bay area (Victoria Land, Antarctica),** *Società Geologica Italiana, Rome. Memorie,* 1991 Vol.46, Meeting on Earth Science Investigations in Antarctica, Siena, Oct. 4-6, 1989. Proceedings, p.521-523, With Italian summary. 8 refs.

This note presents the mosaic of SPOT 1 Multispectral images made digitally from computer compatible tapes of 10 frames. The mosaic has been printed in false color (321 RGB) at a scale of 1:250,000 in a Lambert Conformal Conic projection. The image covers the Terra Nova Bay area of northern Victoria Land between the Drygalski and Parker ice tongues, and includes the Reeves and Priestley outlet glaciers and the basin of the Campbell Glacier. (Auth.)

C-45885

Gubellini, A., Postpischl, D., **Italian geodetic activities in the Terra Nova Bay area (1988 -1990),** New Zealand Geological Survey Report G151, Lower Hutt, NZ, DSIR Geology and Geophysics, 1991, p.26-38, 10 refs.

The participation of a geodetic research group in the 1988-89 Antarctic Italian expedition had as its prevailing objective the design, monumentation and possibly the survey of a geodetic network for the study of crustal deformations in the Mt. Melbourne area. Other activities executed can be summarized as follows: local ellipsoid-geoid deviation at the geodetic station of Terra Nova Bay; classical survey in the area of the Browning Pass considered for the construction of a landing strip; and classical survey of the area appointed for the Winter Base. The network was designed for the systematic use of the GPS technique and can be divided into two parts: a large scale network (40 x 70 km) and a smaller one on the volcanic cone (10 x 10 km). It has been necessary to consider in the design of the network a significant number of points in order to sufficiently focus on the expected deformations. An attempt was made to include at least two points for each block highlighted by the structural scheme, while at the same time maintaining a regular geometry, in order to obtain a rigid network with sides of comparable length. (Auth. mod.)

C-46412

Morgan, P., Tiesler, R., **First epoch GPS baselines between Australia and Antarctica January 1990,** *Australian journal of geodesy, photogrammetry, and surveying,* Dec. 1991 No.51, p.55-66, 3 refs.

GPS campaigns began over modest regions in the mid 80s. Quickly they were enlarged until Nov. 1988, when the first global experiment, GOTEX, was run. Regional results from these small, portable instruments were at or near 1 part in 100 million. It was therefore a natural extension to the development of GPS technology for the technique to be tested in the hostile environment of Antarctica. This paper describes the network that was initiated in Antarctica in Jan. 1990. The data between Australia and New Zealand and Antarctica has been reduced with the MIT GAMIT software which is outlined. Precisions of the order of 1 part in 100 million are reported despite the short observing span and poor geometry. (Auth. mod.)

C-46462

Kaminuma, K., **Antarctic geoscience transect QML-1A and QML-1B,** National Institute of Polar Research. Special map series, No.5, Tokyo, National Institute of Polar Research, 1991, 1 sheet + map.

Two transects are proposed in Queen Maud Land where Japanese antarctic stations Showa and Mizuho are located. Most of the continental area is covered by a huge ice sheet, the thickness of which is more than 2000 m. The existence of the ice sheet is the distinctive character of the antarctic continent transects. A chain of outcrops is located along the coastal area in QML-1B. There are, however, very few geophysical data available. This transect is proposed for deriving mainly geological information. The area in QML-1B is underlain by Lützow-Holm and Yamato-Belgica complexes. The Lützow-Holm complex is mainly composed of Late Proterozoic medium pressure-type metamorphic rocks, and the Yamato-Belgica complex is Late Proterozoic igneous and low pressure-type metamorphic rocks. The geophysical data in the oceanic area of transect QML-1A are mainly gravity, from both sea gravity surveys and the values obtained from satellite altimetric sea surface topography.

C-46520

Stevens, A.R., Mullins, J.L., **Antarctic mapping program,** *Antarctic journal of the United States,* 1990 25(5), p.291-292.

The U.S. Geological Survey's (USGS) antarctic mapping program focused on several activities during the 1989-1990 season in northern

Victoria Land and McMurdo Sound: establishing geodetic control for mapping; a global positioning system campaign; topographic mapping; South Pole satellite doppler tracking and seismology, and managing the U.S. Scientific Committee on Antarctic Research Library for Geodetic and Geographic Information. These activities are described.

C-46572

Sandwell, D.T., **Antarctic marine gravity field from high-density satellite altimetry,** *Geophysical journal international,* May 1992 109(2), p.437-448, Refs. p.447-448.

Closely spaced satellite altimeter profiles (<5 km) collected during the Geosat Geodetic Mission (Geosat/GM), and those planned for the extended ERS-1 mission, are easily converted to grids of vertical gravity gradient and gravity anomaly. Techniques applied to high-density (about 2 km profile spacing) Geosat/GM profiles in antarctic waters are described. Gridding and interpolation are performed using the method of projection onto convex sets where the smoothness criteria correspond to upward continuation through 4 km of ocean. The resultant gravity grids have resolution and accuracy comparable to shipboard gravity profiles. After adjustment of a DC shift in the shipboard gravity profiles (about 5mGal), the rms difference between the ship and satellite gravity is 5.5 mGal. Many interesting and previously uncharted features are apparent in these new gravity maps, including a propagating rift wake and a large 'leaky transform' along the Pacific-Antarctic Rise. (Auth. mod.)

C-46579

Bhikharidas, A.K., Whitehead, M.D., Peterson, J.A., **Mapping Adélie penguin rookeries in the Vestfold Hills and Rauer Islands, East Antarctica, using SPOT HRV data,** *International journal of remote sensing,* May 20, 1992 13(8), p.1577-1583, 14 refs.

Digital analysis of a summer SPOT HRV scene that includes the Vestfold Hills and Rauer Is. yielded the distribution patterns of Adélie penguin rookeries greater than 400 sq m. The significant spectral contrast between the guano and the surrounding bedrock gneiss accounts for the 86% classification accuracy achieved. The mapping in the nearby Rauer Is. presented a different challenge. The rookeries are on unconsolidated sediments, and application of digital image classification techniques was not promising due to spectral overlap between the guano and many of the surrounding surfaces. (Auth.)

C-46700

Urbina, G., Arciniegas, S., Ruano, M., **Geodetic survey at Canto Point in the Second Ecuadorian Expedition** [Trabajos geodésicos realizados durante la II Expedición Ecuatoriana hacia la Antártida en Punta Fort Williams—Isla Greenwich], *Acta antártica ecuatoriana,* 1990 Vol.1, p.79-81, In Spanish with English summary.

The first geodetic survey in Antarctica carried out by the Second Ecuadorian Expedition is described. The area covered is located between Canto Point and Dee I.; the project aims to provide a geodetic net to establish the necessary photocontrol for aero-photogrammetric restitution of the area, which will serve as a base for nautical charts.

C-47050

Kim, Y.D., Kwon, S.J., **GPS positioning of the King Sejong Station, Antarctica,** *Ocean research,* June 1992 14(1), p.35-39, In Korean with English summary. 8 refs.

GPS positioning of the reference survey point at the King Sejong Station was carried out during the 1990/91 austral summer season. The latitude and longitude of 62 13' 23.587"S and 58 47' 21.287"W in WGS-84 were obtained from the average of 74 GPS readings. The obtained longitude differs by 2 minutes from the point projected on the Chilean hydrographic chart. The difference is assumed to come partly from a different geodetic system used for each positioning on the earth's surface. It is more reasonable to use the global geodetic system, WGS-84, for positioning in the antarctic area, since Antarctica is separated from other continents. (Auth.)

C-47155

Acuña, J., **Topographic survey of the South Shetland Is.** [Relevamientos topográficos en las Islas Shetland del Sur], *Montevideo. Instituto Antártico Uruguayo. Actividad científica 1987/88,* Sep. 1989 Vol.3, p.37-38, In Spanish with English summary. 2 refs.

A topographic survey was carried out in the northern portion of Marian Cove during Mar. and Apr., 1988, to provide a basic cartographic document for the studies of geophysics, geology and geochemistry of that area. The reduced version of a chart on a 1:4000 scale, published by the Military Geographic Service of Uruguay after processing the field data, is included. (Auth. mod.)

C-47285

Ghidella, M.E., LaBrecque, J.L., **Magnetic anomalies over the James Ross Island and surrounding areas** [Anomalías magnéticas sobre la isla James Ross y terrenos circundantes], Geología de la isla James Ross (Geology of James Ross I.). Edited by C.A. Rinaldi, Buenos Aires, Dirección Nacional del Antártico, 1992, p.299-313, In Spanish with English summary. 25 refs.

During the USAC aerogeophysical program, the United States, Argentina and Chile carried out, between 1986 and 1989, magnetic and gravity surveys of the ocean basins surrounding the Antarctic Peninsula. Results show that the northwest of James Ross I. is located in the flank of a large-amplitude regional magnetic anomaly which runs along the Antarctic Peninsula arch, and continues over Joinville and neighboring islands and farther over the sea, reaching the NW border of the Powell basin. This anomaly is attributed to calc-alkaline rocks from the Andean Intrusive Suite which penetrate to at least 20 km in depth, and which constitute the basement of part of the Bransfield Strait and the NW border of the Antarctic Peninsula. The anomaly field gets smoother toward the east, showing some isolated peaks belonging to the James Ross volcanic group. To the SE, over the sea, the anomaly field is extremely flat. Quantitative analysis of the data through depth to magnetic basement estimation techniques indicates the existence of a basin increasing in thickness from about 5 km over James Ross I. to more than 10 km in the Weddell Sea. (Auth. mod.)

C-47369

Thomson, J.W., Thomson, M.R.A., Norris, G.N., **Mapping the British Antarctic Territory using a 70 mm reconnaissance camera and satellite imagery,** *Photogrammetric record,* Oct. 1992 14(80), p.277-282, With French and German summaries. 9 refs.

A technique for preparing simple, large scale maps of remote and poorly surveyed areas is described, whereby semicontrolled aerial photograph print laydowns are superimposed on enlarged satellite imagery. (Auth.)

C-47370

Nixdorf, U., **Anomalous focal mechanisms: tension faults studied with seismological and geodetical means on the Ekström Ice Shelf north of Georg von Neumayer Station** [Dehnungsbeben an einer Störungszone im Ekström-Schelfeis nördlich der Georg-von-Neumayer Station, Antarktis. Eine Untersuchung mit seismologischen und geodätischen Methoden], *Berichte zur Polarforschung,* 1992 No.108, 101p., In German with English summary. Refs. p.94-101.

The relation between the deformation of a small part of the Ekström Ice Shelf north of Georg von Neumayer Station and icequakes within that area is investigated. In earlier studies, it was supposed that tension during the widening of those inlets is possibly the only cause of microquakes reported in that region. Geodetical and seismological networks were maintained at one of the inlets in 1987 in order to verify that assumption. The strain network consisted of 7 tripods in the shape of a pentagon with a radius of approximately 500 m; two tripods in the center (distance of 100 m) served as a base. In order to determine the deformation rate this net was surveyed 64 times. Icequakes were recorded by up to eight seismometers distributed on a circle with a radius of approximately 500 m. About 4,000 seismic events were recorded digitally on tape. Inlet events are marked by short and relatively simple wavelets: the duration of the p-phase is about 0.1 s. Shortly after their onset the s-phases are superposed by Rayleigh waves. In addition to single event localizations, all events were relocated using s- arrival times. The errors in the hypocenter coordinates vary between 10 and 20 m and amount to 60 m in one case. The focal depth is about 80 m in all cases. A detected migration of the foci suggests the existence of two dislocation planes within the focal region. They are congruent with the margins of a subsidence trough in the continuation of the inlet. (Auth. mod.)

See also:
E-45366 E-45796 E-45797 E-45798 E-46744 E-47331 F-45492
F-45494 F-45496 F-45516 F-45522 F-45523 F-45528 F-45529
F-45530 F-45989 F-46107 F-46256 F-46497 F-46502 F-46904
G-45375 G-46775 I-45647 I-45675 I-46595 I-47311 J-45946
J-46872 K-45133 L-46086

D. EXPEDITIONS

D-45311
Kornilov, N.A., Alekseev, G.V., **Expedition studies in polar and subpolar regions of the World Ocean** [Ekspeditsionnye issledovaniia poliarnykh i subpoliarnykh akvatoriĭ Mirovogo okeana], *Problemy arktiki i antarktiki,* 1991 Vol.66, p.156-161, In Russian with English summary. 13 refs.

The results of expedition studies in polar and adjacent areas of the World Ocean aboard research vessels of the Arctic and Antarctic Research Institute are summarized. Main scientific results are noted and prospects for research in the future are given. (Auth. mod.)

D-45561
Hatherton, T., **Historic overview: Great Britain, New Zealand and Antarctica,** Antarctica and global climatic change, edited by C.M. Harris and B. Stonehouse, London, Boca Raton, FL, Bellhaven Press, Lewis Publishers, 1991, p.1-8, 4 refs.

The continuing, sometimes parallel and sometimes divergent, interests of the UK and New Zealand in Antarctica are briefly examined as to influences each had upon the other, and outside influences on both. The divergences seem to be in ascendancy currently, as Britain focuses attention on Europe while New Zealand turns its eyes to the nations of the Pacific rim. Future joint research between the two countries may take the form of cooperative projects which are more difficult to quantify on a global basis. The author also reviews the chronology of UK/NZ research efforts in Antarctica.

D-46057
RV *Polarstern* Antarktis X/3-5 1992, Bremerhaven, Alfred-Wegener-Institut für Polar-und Meeresforschung, 1992, 43p., With German summary.

The German antarctic marine science program aboard FS *Polarstern,* Mar. through Aug. 1992, is presented. The cruise leg ANT X/3 commences in Cape Town, South Africa, on Mar. 27, 1992 and ends there on the May 19, 1992. The cruise track extends SSW-ward to the vicinity of Neumayer Station for studies at the ice edge. The major goal of this part of the expedition is to obtain a comprehensive picture of physical, chemical and biological processes associated with the onset of sea ice formation. Additional programs include a study of the continental water boundary in the eastern Weddell Sea, recovery and deployment of sediment trap moorings, programs on fish physiology, deep sea benthos and deep sea microbiology. A core goal of ANT X/4 is the ground truth program for the ERS-1, SAR and ATSR instruments, the RAR on the Russian OKEAN satellite, the NOAA-AVHRR and the DMSP-SSM/I. Several characteristics of sea ice and snow such as salinity- and temperature-profiles, pore-size, texture, density, dielectric constant and small-scale surface roughness, will be determined for improvements of algorithms for satellite measurements. The main goal of the cruise leg ANT X/5, which is scheduled to start at Puerto Madryn on Aug. 8, 1992 and to end at Punta Arenas on Sep. 26, 1992, is a marine geological survey on transects in the southern Argentine Basin, the eastern Georgia Basin and in the area of the South Sandwich Trench, and the Scotia Sea involving isotope, micropaleontological and sedimentological investigations.

D-46763
Bathmann, U., ed, **Expeditions of the RV *Polarstern* in 1990/91, ANTARKTIS IX/1-4** [Die Expeditionen ANTARKTIS/IX/1-4 des Forschungsschiffes *Polarstern* 1990/91], *Berichte zur Polarforschung,* 1992 No.100, 403p., In German and English with summaries in both languages. Refs. passim.

The ninth research cruise of RV *Polarstern* to the Antarctic (ANT IX) consisted of 4 legs. The first leg addressed chemical interactions between ocean and atmosphere during the southward voyage. The second leg carried out investigations of the Weddell Gyre within the framework of the World Ocean Circulation Experiment (WOCE). The third leg was planned as a broad-based interdisciplinary study of the hitherto unexplored southwestern Weddell Sea, but had to be reorganized with a new scientific program for the Lazarev Sea because of exceptionally heavy ice conditions in the Weddell Sea. On several transects along the shelf and into the deep sea, all disciplines participating on this cruise—oceanography, biology and geology—investigated in closely interlocked programs the water mass distribution and water chemistry as well as the morphology of the sea floor and composition of the sediments. The fourth leg departed from Cape Town on Mar. 30 and proceeded to Bouvet I. The aim of this predominantly geological leg was to map and sample submarine elevations: the Agulhas Ridge, the Meteor Rise and the eastern flank of the southernmost Mid-Atlantic Ridge, in order to refine existing models of the paleoceanography of the South Atlantic. *Polarstern* returned to Bremerhaven on May 13, 1991. (Auth. mod.)

See also:
G-46898

E. GEOLOGICAL SCIENCES

E-45066

International Symposium on Antarctic Earth Sciences, 6th, **Abstracts of papers,** [Tokyo], National Institute of Polar Research, 1991, 673p.

This conference met in mid-Sep. 1991 at the National Women's Education Center in Saitama Prefect in Southern Japan. The volume contains abstracts of the papers to be delivered at the Conference, arranged in alphabetical order by first author. Some 20 countries are represented, and at least 22 different specific topics in Earth sciences are addressed; an estimated 250 plus abstracts comprise the volume. On average, each abstract carries three pages, some as few as one or as many as six; most have multiple authors, references, and diagrams. There is no table of contents or index.

E-45080

Nuñez, J.H., Del Valle, R.A., **Paleomagnetism in sedimentary rocks of Cape Longing, Antarctic Peninsula** [Paleomagnetismo con rocas sedimentarias de Cabo Longing, Peninsula Antartica], *Buenos Aires. Instituto Antártico Argentino. Contribución,* 1991 No.399, 13p., In Spanish with English and French summaries. 8 refs.

A paleomagnetic study of marine sedimentary rocks belonging to the Longing Formation, cropping out in the eastern border of the Antarctic Peninsula, was carried out. Eight samples corresponding to each level of stratification, which cover a thickness of 30 m, were analyzed. The stable residual magnetism (S.R.M.) of each sample was isolated through the technique of thermal demagnetization; the respective virtual geomagnetic poles (V.G.P.) and the paleopoles of the Longing Formation were calculated. The interpretation of the results confirms the paleontological age of the Longing Formation and the absence of tectonic modifications in the last 100 m.y. in the Antarctic Peninsula and in the Eastern Antarctic Craton. (Auth.)

E-45089

Colhoun, E.A., **Geological evidence for changes in the East Antarctica ice sheet (60 deg - 120 deg E) during the last glaciation,** *Polar record,* Oct. 1991 27(163), p.345-355, 58 refs.

The east antarctic ice sheet advanced onto the continental shelf during the last glaciation, but appears to have been thinner than previously hypothesized and probably did not everywhere extend to the edge of the continental shelf. Where the shelf is wide, the ice probably terminated against shallow banks on its outer edge. Large outlet glaciers occupied deep troughs that conveyed most of the ice towards the edge of the shelf; intervening areas were less intensely glaciated. Much of Prince Charles Mountains and Amery Oasis were not ice-covered; Vestfold, Bunger and Casey oases were glaciated. Vestfold and Bunger oases became ice-free after 10 ka BP under the influence of the Holocene marine transgression, which was complete by about 6 ka BP. During at least the last 5-6 ka these oases have been approximately their present size. Since then the margins of the antarctic continental ice sheet have maintained almost steady-state conditions against the landward edges of the hill masses. (Auth. mod.)

E-45092

Kaul, N.E., **Detailed seismic investigations at the eastern continental margin of the Weddell Sea off Cape Norvegia, Antarctica** [Detaillierte seismische Untersuchungen am östlichen Kontinentalrand des Weddell-Meeres vor Kapp Norvegia, Antarktis], *Berichte zur Polarforschung,* 1991 No.89, 120p., In German with English summary. Refs. p.114-119.

Reflection and refraction seismic experiments as well as magnetic and gravity measurements have been analyzed. The summarized data of all investigations show that the evolution of the continental margin is divided into three different periods. The first period ending in the middle Jurassic is characterized by the occurrence of seaward dipping reflectors containing extruded lavas. The dominant direction of tectonical features during this period was 70 deg-80 deg WSW-ENE. The second period lasts until the end of the Jurassic. A thick sequence of hemipelagic coarse clastic sediments had been deposited. The base and top of this sequence are documented by seismic reflectors. Under these hemipelagic conditions a barrier-like carbonate structure develops in a WSW-ENE direction. The third period started in the lower Cretaceous. Reflector w3 separates the lower coarse sediments from the clayey to silty facies of the Cretaceous. This level reflector marks the top of the barrier and thus indicates its decreasing significance on sedimentation processes. High amounts of organic material in Albian through Hauterivian strata testify to anoxic conditions in the lower Cretaceous. A gradual increase of oxygen content in the sediments since the middle lower Cretaceous indicates the opening of a deep oceanic basin. In the lower Cretaceous a deep water circulation develops together with the dominant morphological scarps, the Explora Escarpment and the continental shelf edge. The Explora Escarpment attains its maximum step height (ca. 1200 m) in the vicinity of the Wegener Canyon. Nearly symmetric tilts to both sides of the Wegener Canyon have been found in seismic profiles parallel to the escarpment. All units older than the Cretaceous show faulting along the canyon. (Auth. mod.)

E-45097

Domack, E.W., Jull, A.J.T., Nakao, S., **Advance of east antarctic outlet glaciers during the Hypsithermal: implications for the volume state of the antarctic ice sheet under global warming,** *Geology,* Nov. 1991 19(11), p.1059-1062, 31 refs.

Presented here is the first circum-east antarctic chronology for the Holocene, based on 17 radiocarbon dates generated by the accelerator method. Marine sediments from around East Antarctica contain a consistent high-resolution record of terrigenous (ice-proximal) and biogenic (open-marine) sedimentation during Holocene time. This record demonstrates that biogenic sedimentation beneath the open-marine environment on the continental shelf has been restricted to approximately the past 4 ka, whereas a period of terrigenous sedimentation related to grounding line advance of ice tongues and ice shelves took place between 7 and 4 ka. An earlier period of open-marine (biogenic sedimentation) conditions following the late Pleistocene glacial maximum is recognized from the Prydz Bay (Ocean Drilling Program) record between 10.7 and 7.3 ka. Clearly, the response of outlet systems along the periphery of the east antarctic ice sheet during the mid-Holocene was expansion. This may have been a direct consequence of climate warming during an antarctic "Hypsithermal." Temperature vs. accumulation relations for the Antarctic indicate that warming will cause a significant increase in accumulation rather than in ablation. Models that predict a positive mass balance (growth) of the antarctic ice sheet under global warming are supported by the mid-Holocene data presented herein. (Auth.)

E-45098
Pirrie, D., Marshall, J.D., **Diagenesis of *Inoceramus* and Late Cretaceous paleoenvironmental geochemistry: a case study from James Ross Island, Antarctica,** *Palaios,* Aug. 1990 5(4), p.336-345, 31 refs.

Inoceramid bivalves and dimitobelid belemnites from the Santonian-Campanian of James Ross I. were analyzed for their isotopic and elemental geochemistry. On the basis of petrographic and cathodoluminescence studies and minor element data, the dimitobelid belemnites show minimal diagenetic modification. They have median *delta*O-18 and *delta*C-13 values of -0.45 and 2.05 per mill, respectively. Epifaunal inoceramid bivalves from the same sequence show more intense diagenetic alteration, with cements rimming individual calcite prisms and partial neomorphism of some prism interiors. Early diagenesis of *Inoceramus* prismatic calcite is thought to be related to the breakdown of an original organic sheath. However, the geochemical signature of unaltered aragonite nacre and apparently partially altered prismatic calcite from *Inoceramus* both give much lighter oxygen isotopic values than the belemnites. Paleotemperatures calculated from the isotopic composition of the belemnites give an average of 13.6 C for the 'normal' marine waters. However, paleotemperatures based on the inoceramid bivalve data imply considerably higher values. Thus although geochemistry is a powerful tool in paleoenvironmental analysis, habitat-related controls may significantly alter the observed geochemical signature. (Auth. mod.)

E-45105
Staudacher, T., Allègre, C.J., **Cosmogenic neon in ultramafic nodules from Asia and in quartzite from Antarctica,** *Earth and planetary science letters,* Sep. 1991 106(1/4), p.87-102, 50 refs.

Noble gas concentrations of Ar, Kr, and Xe and isotopic ratios of He, Ne, Ar and Xe in ultramafic rock samples from Vitim Highland, about 200 km east of Lake Baikal, and from the Tariat Depression in north-central Mongolia, and a quartz sample from Arena Valley near Taylor Glacier, are analyzed. Details are set forth in tables and explained in the text.

E-45106
Baum, S.K., Crowley, T.J., **Seasonal snowline instability in a climate model with realistic geography application to Carboniferous (about 300 Ma) glaciation,** *Geophysical research letters,* Sep. 1991 18(9), p.1719-1722, 32 refs.

Identified in this paper is a snowline instability that has been found in a two-dimensional EBM (energy balance model) utilizing a realistic geographic reconstruction of Gondwanaland for the Carboniferous (about 305 Ma), at the time of a major glacial period in Earth history. Several experiments were conducted, all with solar luminosity reduced 3% to reflect lower solar output. A baseline simulation for a "hot summer orbit" configuration yielded a South Polar temperature of 31 C. As the orbit was changed to a "cold summer orbit" and luminosity was gradually decreased, ice area linearly increased from 0.0 to 7.5 million sq km (equivalent to about two-thirds the size of the present East Antarctic Ice Sheet). Additional small decreases in luminosity for the cold summer orbit configuration resulted in an abrupt increase in summer ice area to 26 million sq km. The transition occurs due to a perturbation of only 0.002 W/sq m, a perturbation much smaller than those due to Milankovitch variations or volcanic eruptions. The calculated area of expanded ice cover compares favorably with the distribution of glacial deposits in the Carboniferous. These results provide further support for the existence of the snowline instability mechanism and suggest a possible explanation for both initiation of glaciation and glacial oscillations during the Carboniferous. (Auth. mod.)

E-45113
Bardin, V.I., **Antarctic lakes a source of paleoglacial information,** Actas de la Primera Conferencia Latinoamericana sobre Geofísica, Geodesia e Investigación Espacial Antárticas. (First Latin American Conference on Antarctic Geophysics, Geodesy and Space Research, Buenos Aires, July 30-Aug. 3, 1990. Proceedings.) Edited by A. Louro, M.A. Van Zele, and I. Velasco, ꞁBuenos Aires, Centro Latinoamericano de Física, 1990ꞁ, p.3-7, 14 refs.

Studies carried out principally in the lakes of Victoria Land, Queen Maud Land and the Prince Charles Mountains, are briefly reviewed. The importance of information obtained from the lake sediments, in determining the paleogeographic and paleoglacial conditions of the lake's development, is emphasized. It is concluded that since the present antarctic basins throw light only on the very last stages of antarctic glaciation, it is very important to examine ancient lake sediments and ice to understand the migration of basins caused by changes in glacial, geomorphological and climatic conditions.

E-45114
Ghidella, M.E., LaBrecque, J.L., **Correction of the Weddell Sea western margin topography based on aerogravimetric data** [Corrección a la topografía del margen del Weddell Oeste sobre la base de datos aerogravimétricosꞁ, Actas de la Primera Conferencia Latinoamericana sobre Geofísica, Geodesia e Investigación Espacial Antárticas. (First Latin American Conference on Antarctic Geophysics, Geodesy and Space Research, Buenos Aires, July 30-Aug. 3, 1990. Proceedings.) Edited by A. Louro, M.A. Van Zele, and I. Velasco, ꞁBuenos Aires, Centro Latinoamericano de Física, 1990ꞁ, p.8-18, In Spanish. 14 refs.

From magnetic data obtained during 36 flights over the Weddell Sea, estimates of the magnetic basement depth are made on a regional scale, over the area between 60-44W and 73-62S. By subtracting the GEBCO bathymetric values, a map of the sedimentary thickness is compiled which shows, along with a map of gravimetric anomalies, that bathymetry in this zone can be inaccurate because of the sea ice cover. The necessary calculations for topographic corrections are carried out.

E-45115
Quilty, P.G., **Implications of Late Neogene sediments from Vestfold Hills, East Antarctica,** Actas de la Primera Conferencia Latinoamericana sobre Geofísica, Geodesia e Investigación Espacial Antárticas. (First Latin American Conference on Antarctic Geophysics, Geodesy and Space Research, Buenos Aires, July 30-Aug. 3, 1990. Proceedings.) Edited by A. Louro, M.A. Van Zele, and I. Velasco, ꞁBuenos Aires, Centro Latinoamericano de Física, 1990ꞁ, p.19-24, 11 refs.

The Vestfold Hills are of low relief (maximum elevation approximately 160 m) and consist of 2.5-2.8 b.y. gneisses, strongly folded along east-northeast trending axes. The Archaean gneisses are intruded by very numerous basalt (now metabasalt) dykes, of many ages, all post folding. Ages range from 2.5-1.1 b.y. These dykes together constitute one of the major features of the Vestfold Hills. They are more resistant to physical and chemical weathering than the surrounding rocks and thus they stand above the country rock by a few cm to perhaps a meter. Pliocene and a poorly dated interglacial Pleistocene unit now lie very close to the elevation at which they were deposited.

Water temperatures were warmer than now. Mid Holocene sediments are now rising isostatically at about 1 mm/year but at present, due to modern sea level rise caused by melting of mid latitude glaciers and seawater thermal expansion, there is little relative sea level rise. The Vestfold Hills have been remarkably stable over the last 5 Ma. Despite cyclical variation in altitude during the Quaternary due to ice loading, the area seems regularly to return to its present level.

E-45117
Ghidella, M.E., LaBrecque, J.L., **Considerations on the morphology of the western Weddell Sea based on aerogeophysical data** [Consideraciones sobre la morfología del mar de Weddell Oeste basadas en datos aerogeofisicos], Actas de la Primera Conferencia Latinoamericana sobre Geofísica, Geodesia e Investigación Espacial Antárticas. (First Latin American Conference on Antarctic Geophysics, Geodesy and Space Research, Buenos Aires, July 30-Aug. 3, 1990. Proceedings.) Edited by A. Louro, M.A. Van Zele, and I. Velasco, [Buenos Aires, Centro Latinoamericano de Física, 1990], p.34-44, In Spanish. Refs. p.38-40.

From magnetic data obtained during 36 flights, regional estimates were carried out of the crustal structure and the sedimentary thickness of the Weddell basin. The method used for the magnetic basement depth calculations is described, and the resulting maps are presented and discussed. Results obtained are found to agree with those arrived at by other methods.

E-45148
Birkenmajer, K., Guterch, A., Grad, M., Janik, T., Perchuć, E., **Lithospheric transect, Antarctic Peninsula—South Shetland Islands, West Antarctica,** *Polish polar research,* 1990 11(3-4), p.241-258, Refs. p.255-257.

The lithospheric transect of South Shetland Is.—Antarctic Peninsula includes: the Shetland Trench (subductional) and the adjacent portion of the SE Pacific oceanic crust; the South Shetland Microplate (younger back-arc basin); the Trinity Horst (older magmatic arc superimposed on continental crust); the Gustav Rift (Late Cenozoic) and James Ross Platform (older back-arc basin). Deep seismic sounding allowed the authors to trace the Moho discontinuity at about 30 km under the South Shetlands and at 38-42 km in the northern part of Antarctic Peninsula (Trinity Horst), under typical continental crust. Modified crust was recognized under Bransfield Strait. Geological interpretation based on deep seismic refraction and multichannel reflection soundings, and surface geological data, are presented. (Auth.)

E-45149
Kowalewski, W., Rudowski, S., Zalewski, S.M., **Seismoacoustic studies within flooded part of the caldera of Deception Island, West Antarctica,** *Polish polar research,* 1990 11(3-4), p.259-266, 9 refs.

Results of detailed seismoacoustic profiling (CSP, boomar), carried out in Feb. 1985 and 1988 on Deception I., are presented. The boomar penetration of the caldera floor went down to 150 msec. Four seismoacoustic units of volcanic formations have been determined. Unit A corresponds to pre-caldera series and occurred only in the border part of the flooded caldera. The unit contains mainly pyroclastic rocks (consolidated agglomerates and tuffs) and probably some intercalations of lavas. Units B, C and D fill up the caldera bottom and correspond to post-caldera series. The units are composed of pyroclastic rocks, containing also materials redeposited by lahars, glaciers, landwaters and wind. Units C and D (the youngest one) were certainly deposited under water. All the units are cut by numerous faults, vents and other types of intrusions. The larger faults are situated around the bottom and form a ring-fracture. The caldera was formed by successive stages of collapsing. This process is not finished yet and volcanic activity is still present, especially in the western part of the flooded caldera. (Auth. mod.)

E-45152
McKnight, D.M., Aiken, G.R., Smith, R.L., **Aquatic fulvic acids in microbially based ecosystems: results from two desert lakes in Antarctica,** *Limnology and oceanography,* July 1991 36(5), p.998-1006, 18 refs.

Fulvic acids from two antarctic lakes were examined to determine the chemical characteristics of dissolved fulvic acid derived from organic material of microbial origin. These lakes receive very limited inputs of organic material from the surrounding barren desert, but they sustain algal and bacterial populations under permanent ice cover. One lake has an extensive anoxic zone and high salinities; the other is oxic and has low salinities. Despite these differences, fulvic acids from both lakes had similar elemental compositions, carbon distributions, and amino acid contents, indicating that the chemistry of microbially derived fulvic acids is not strongly influenced by chemical conditions in the water column. Compared to fulvic acids from other natural waters, these fulvic acids have low C:N atomic ratios (19-25) and low contents of aromatic carbons (5-7% of total carbon atoms); they are most similar to marine fulvic acids. (Auth.)

E-45157
Nishiizumi, K., **Cosmic ray produced Be-10 and Al-26 in antarctic rocks: exposure and erosion history,** *Earth and planetary science letters,* June 1991 104(2/4), p.440-454, 40 refs.

Be-10 and Al-26 in purified quartz fractions of selected rock samples from antarctic mountains have been measured. From these data were calculated mean erosion rates, for the limiting case of steady-state surface exposure to cosmic rays, and minimum exposure ages, for the limiting case of no erosion. Calculated mean erosion rates are very low, on the order of 0.00005 cm/yr; it appears the sampling is sufficient to generalize this result to exposed bedrock in Antarctica. In favorable cases it is possible to distinguish between the limiting cases: steady-state erosion seems a better description in such cases. Most samples, including some taken a few meters above the present ice level, seem to have been exposed for millions of years, without major episodes of burial or abrasion by ice. (Auth.)

E-45166
Bryant, W.R., Bennett, R.H., Burkett, P.J., Rack, F.R., **Microfabric and physical properties characteristics of a consolidated clay section: ODP Site 697, Weddell Sea,** *U.S. National Oceanic and Atmospheric Research Laboratory. Report,* 1991 JA-360-039-90, 20p., ADA-231 609, 40 refs. Reprinted from "Microstructure of fine-grained sediments", edited by R.H. Bennett et al.

A clay-rich sediment section 318 m thick, recovered during Ocean Drilling Program Leg 113 from the South Orkney Continental Margin, Site 697 in the Weddell Sea, was examined by scanning and transmission electron microscopy of sediment stubs and ultra-thin sections. Reorientation of randomly arranged particles of this fine-grained, high porosity (70-75%) sediment occurs very gradually. Porosity decreases to only about 50% at a depth of 318 m, because of the very fine-grained nature of the sediment and the presence of extremely fine-grained smectite, which imparts a very low permeability even at porosities of 50%. The purpose of this study is to characterize the microstructure of a slowly consolidating clayey sediment mass as it compacts from a mud to a mudstone, and evaluate the relationship of sediment pore size, microfabric, and mineralogy to the porosity and the permeability of the material. (Auth. mod.)

E-45201

Lindstrom, M.M., Schwarz, C., Score, R., Mason, B., **MacAlpine Hills 88104 and 88105 lunar highland meteorites: general description and consortium overview,** *Geochimica et cosmochimica acta,* Nov. 1991 55(11), MacAlpine Hills Lunar Meteorite Consortium, Mar. 1990, Houston, TX, p.2999-3007, 32 refs.

MacAlpine Hills 88104 and 88105 are new lunar meteorites returned from Antarctica by the 1988-1989 US meteorite collection team. The two specimens were found in nearby locations and, based on field and laboratory evidence, are thought to be pieces of the same meteorite. MAC88105 is the largest lunar meteorite yet found (662 g). MAC88105/5 is an anorthositic breccia consisting of numerous small clasts in a glassy matrix. An origin on the Moon is supported by the mineral, bulk, and oxygen isotope compositions. A consortium of twenty research groups has studied these meteorites. Samples were prepared at the NASA Johnson Space Center meteorite processing laboratory. Details of consortium plans and allocations are documented herein. A summary list of lunar meteorites and an overview of consortium research is presented. Discussions in this and the following consortium papers involve the issue of paired meteorites and paired ejecta, and what new information about the nature and evolution of the lunar crust is provided by the lunar meteorites. (Auth.)

E-45202

Takeda, H., Mori, H., Saito, J., Miyamoto, M., **Mineral-chemical comparisons of MAC 88105 with Yamato lunar meteorites,** *Geochimica et cosmochimica acta,* Nov. 1991 55(11), MacAlpine Hills Lunar Meteorite Consortium, Mar. 1990, Houston, TX, p.3009-3017, 40 refs.

Clast types and pyroxene compositions of MAC88105 indicate that evidence for a pairing with any known lunar meteorites is unlikely. Clast-laden vitric breccia and comminuted mineral fragments in glassy matrix are common components as in other lunar meteorites, but granulitic clasts are not as common as in other lunar meteorites. The large and common granulite-like meta-igneous clasts still preserve lath-shaped plagioclase crystals with fine-grained olivine and pyroxenes in the interstices. Pyroxenes with *mg* number=Mg x 100/(Mg+Fe) between 70-48 mol% are common, but more Mg-rich pyroxenes and plutonic pyroxenes from nonmare pristine crustal rocks are rare. One basaltic clast contains pyroxenes with zoning trends more Mg-rich than the above *mg* range and than those of the VLT basalts common in lunar meteorites. MAC88105 preserves true glass in the matrix as observed by a transmission electron microscope (TEM). The preservation of glassy materials indicates that MAC88105 had a metamorphic annealing history different from other lunar meteorites. (Auth.)

E-45203

Delano, J.W., **Geochemical comparison of impact glasses from lunar meteorites ALHA81005 and MAC88105 and Apollo 16 regolith 64001,** *Geochimica et cosmochimica acta,* Nov. 1991 55(11), MacAlpine Hills Lunar Meteorite Consortium, Mar. 1990, Houston, TX, p.3019-3029, 70 refs.

Most glasses that occur in lunar highland regolith are quenched droplets of impact melt. The chemical compositions of these glasses are equivalent, in the absence of volatile losses, to the original target materials. The compositional range of impact glasses in a regolith reflects the chemical diversity that existed throughout the region up to the time of system closure (e.g., breccia formation). Since these glasses are a product of widespread and random sampling, both in terms of space and time, they can be used for geochemical exploration of the Moon. The major-element compositions of impact glasses occurring in three samples of lunar feldspathic regolith (ALHA81005; MAC88105; Apollo 16 64001) have been determined by electron microprobe. The glass populations among these three unrelated samples are compositionally distinct. While most of the impact glasses within each of the three samples are compositionally similar to the regolith in which they are found, up to 40% of the impact glasses are different. Some of the compositionally exotic glasses were ballistically transported from other areas of the Moon and thereby provide information about the compositional range of regoliths that exist elsewhere. Since the geological setting of the Apollo 16 region is well known compared to the source areas of the lunar meteorites, the Apollo 16 glasses provide a ground truth for interpretations. (Auth. mod.)

E-45204

Taylor, G.J., **Impact melts in the MAC88105 lunar meteorite: inferences for the lunar magma ocean hypothesis and the diversity of basaltic impact melts,** *Geochimica et cosmochimica acta,* Nov. 1991 55(11), MacAlpine Hills Lunar Meteorite Consortium, Mar. 1990, Houston, TX, p.3031-3036, 38 refs.

The MAC88105 lunar meteorite, as represented by thin section 78, contains three major types of impact melt breccias. The most abundant type is clast-laden, fine-grained, and rich in Al2O3 (28 wt%); these clasts constitute most of the meteorite. Their abundance and aluminous nature indicate that the MAC88105 source area was very aluminous. This is consistent with formation of the primordial lunar crust from a global magma ocean. The second type of impact melt is represented by only one clast in 78. It has a basaltic bulk composition similar to many other lunar impact melts, but is significantly richer in P2O5 than most and has a much lower MgO/(MgO+FeO). The third impact-melt type resembles a prominent melt group at Apollo 16, but has lower MgO/(MgO+FeO). These data show that basaltic impact melts are compositionally diverse. Dating samples of the Al-rich impact melts and the new types of basaltic impact melts from this meteorite can test the idea that the Moon suffered a terminal cataclysm 3.9 Ga ago. (Auth.)

E-45205

Neal, C.R., Taylor, L.A., Lui, Y.G., Schmitt, R.A., **Paired lunar meteorites MAC88104 and MAC88105: a new "FAN" of lunar petrology,** *Geochimica et cosmochimica acta,* Nov. 1991 55(11), MacAlpine Hills Lunar Meteorite Consortium, Mar. 1990, Houston, TX, p.3037-3049, 64 refs.

New lunar meteorite MAC88104/5 represents an exciting new opportunity to study a potentially unsampled region of the Moon. The authors have analyzed six thin sections by electron microprobe and three bulk samples by Instrumental Neutron Activation (INA) in order to determine the chemical characteristics of this new lunar sample. Lunar meteorite MAC88104/5 is dominated by lithologies of the ferroan anorthosite (FAN) suite and contains abundant granulitized highland clasts, devitrified glass beads of impact origin, and two small clasts which appear to be of basaltic origin. Impact melt clasts MAC88105,69 and ,72 have major and trace element compositions similar to the bulk meteorite. There is little evidence of any LKFM (Low-K Fra Mauro or low-K KREEP) contribution to this meteorite, as MAC88104/5 and other brecciated lunar meteorites are Fe-rich and poor in the incompatible elements relative to Apollo 16 regolith and feldspathic breccias. While the exact size of origin for the lunar meteorites cannot be pinpointed, it is evident that they were derived from a relatively KREEP-free ferroan anorthosite terrain. (Auth. mod.)

E-45206

Jolliff, B.L., Korotev, R.L., Haskin, L.A., **Ferroan region of the lunar highlands as recorded in meteorites MAC88104 and MAC88105,** *Geochimica et cosmochimica acta,* Nov. 1991 55(11), MacAlpine Hills Lunar Meteorite Consortium, Mar. 1990, Houston, TX, p.3051-3071, 73 refs.

MAC88104 and MAC88105 are paired fragments of a meteorite that contains a variety of materials including impact-melt breccias, igneous and metamorphosed breccia clasts, glass clasts and veins, mineral clasts, and extralunar meteoritic debris. The integrated study of all of these materials provides us with remarkably detailed information on the nature of the lunar crust from which this meteorite derived. Compositions of the bulk meteorite and its components indicate that it came from a region of the Moon's crust that was highly aluminous, low in incompatible trace elements, and markedly ferroan in character. As such, this meteorite and its components appear to be an excellent sample of what may be "typical" lunar highlands crust, practically uncontaminated by mare basalt and ITE-rich material (KREEP) that is associated with the large nearside impact basins. The high modal abundance of feldspathic impact-melt lithologies that occur as macroscopic and microscopic clasts in MAC88104/5 reflects an origin from a terrane dominated by impact debris, perhaps a regolith developed on a melt sheet. Igneous clasts include troctolitic anorthosite, anorthositic norite, gabbronorite, and anorthosite. As a group, the mineral clasts are ferroan and consistent with derivation from a suite of igneous precursor rocks similar to the igneous clasts. This suite is more representative of the set of products expected from an igneous system crystallizing plagioclase from a ferroan liquid than are the highly feldspathic, ferroan rocks from Apollo 16. (Auth. mod.)

E-45207

Koeberl, K., Kurat, G., Brandstätter, F., **MAC88105—a regolith breccia from the lunar highlands: mineralogical, petrological, and geochemical studies,** *Geochimica et cosmochimica acta,* Nov. 1991 55(11), MacAlpine Hills Lunar Meteorite Consortium, Mar. 1990, Houston, TX, p.3073-3087, 77 refs.

MAC88105 is a mixture of rocks with a predominant contribution from the anorthosite suite and small admixtures from other rock types (mare basalt, Mg suite), which becomes obvious in plots of molar *mg* or Sm content vs. the Ti/Sm ratio. The siderophile element abundances in MAC88105 are similar to other highland meteorites and show the characteristic Co excess and a Au/Ir ratio similar to the other anorthositic meteorites and lower than the hyperchondritic ratio in Apollo 16 rocks. This supports the notion that the lunar meteorites are a more representative sample of the lunar highlands than the Apollo samples. The chemistry and mineralogy of MAC88105 are different from that of the other lunar meteorites and suggest a different source, which is supported by cosmic-ray and noble gas data. It now seems likely that about four individual impact events have been responsible for delivering the seven highland meteorites. MAC88105 and other lunar meteorites are important as they are probably random samples from the lunar surface and may thus be more representative than the Apollo and Luna rocks which come from only a small area of the moon. (Auth. mod.)

E-45208

Lindstrom, M.M., **Geochemistry and petrography of the MacAlpine Hills lunar meteorites,** *Geochimica et cosmochimica acta,* Nov. 1991 55(11), MacAlpine Hills Lunar Meteorite Consortium, Mar. 1990, Houston, TX, p.3089-3103, 53 refs.

MacAlpine Hills 88104 and 88105 are anorthositic lunar meteorites recovered from the same area in Antarctica which are demonstrated to be paired samples of the same fall. Petrographic studies of matrix and clasts show that MAC88104/5 is a polymict breccia dominated by impact melt clasts. It contains a small amount of highland impact glass and very few regolith glass spherules. It is better classified as a fragmental breccia than a regolith breccia. The bulk composition is ferroan (mg'=63) and highly aluminous (Al2O3=28%). REE and other incompatible element concentrations are very low. Compositions of anorthositic, granulitic, and impact melt breccia clasts are very similar to, but distinct from, matrix composition. MAC88104/5 is very similar in composition to the other anorthositic lunar meteorites, but each of the meteorites is distinct. The anorthositic lunar meteorites, especially MAC88104/5 and Y82192/3/86032, are very similar to North Ray Crater feldspathic fragmental breccias in composition and petrography. These fragmental lunar meteorites may have been ancient, deeply buried breccias from the megaregolith. Comparisons of chemical-petrographic features and exposure histories suggest that the twelve lunar meteorites were derived from two to nine, but probably four to seven, impacts onto the lunar surface. Discrepancies between the proportions of lunar meteorites and results of Apollo missions may be due to unrepresentative sampling. Lunar meteorites provide valuable new information on the nature of the lunar crust. (Auth.)

E-45209

Palme, H., **Lunar highland meteorites and the composition of the lunar crust,** *Geochimica et cosmochimica acta,* Nov. 1991 55(11), MacAlpine Hills Lunar Meteorite Consortium, Mar. 1990, Houston, TX, p.3105-3122, 82 refs.

The seven lunar highland meteorites: MAC88104/5, ALHA81005, Y86032, Y82192/3, and Y791197 represent at least three and probably four different events that delivered material from the lunar highlands to the Earth. The chemical composition of these seven meteorites is to a first approximation very similar. Variations in calculated modal plagioclase contents are surprisingly small. Compositions of plagioclase and mafic components among these meteorites appear to be somewhat variable, with no apparent geochemical correlation between the compositions of plagioclase and mafic minerals. Some variations occur in absolute and relative abundances of incompatible elements. The shapes of normalized REE patterns range from KREEPy to nearly unfractionated. Absolute abundances vary by a factor of three. Siderophile and volatile elements are present at about a 1% CI level. There is no correlation between solar wind exposure and abundance of siderophile or volatile elements, suggesting that they were not introduced as micrometeoritic components. It is suggested that siderophile and volatile elements record the last spike of accretion after crystallization of the magma ocean. Enrichment of volatiles found in certain fractions of Y791197 may reflect outgassing of the Moon. (Auth.)

E-45210

Warren, P.H., Kallemeyn, G.W., **MacAlpine Hills lunar meteorite and implications of the lunar meteorites collectively for the composition and origin of the Moon,** *Geochimica et cosmochimica acta,* Nov. 1991 55(11), MacAlpine Hills Lunar Meteorite Consortium, Mar. 1990, Houston, TX, p.3123-3138, 87 refs.

The MAC88104/5 meteorite is a lunar highlands regolith breccia, even more anorthositic than previously available samples of highlands regolith. Regolith breccias are far more abundant among lunar highlands meteorites than among rock samples from the classic highlands site, Apollo 16. For the major-element composition of the crust, the lunar meteorites indicate that the central nearside Apollo and Luna sites, especially Apollo 16, are approximately representative. The consistently high-Al2O3 composition indicated for the upper crust supports the magmasphere hypothesis. For the trace-element composition of the crust, the meteorites indicate that the central nearside

Apollo and Luna sites are in several respects unrepresentative. (1)Incompatible elements are far lower in the lunar highlands meteorites than in regolith samples from the central nearside. This trend implies that some lower limits on the bulk-Moon content of U should be relaxed. Models of lunar origin implying large enrichments of Th, U, and associated refractory lithophile elements are not favored by the new constraints from the lunar meteorites. (2)Siderophile element contents tend to be lower in highlands-meteoritic regolith breccias than in their central nearside counterparts. The high overall siderophile levels and hyperchondritic Ni/Ir and Au/Ir ratios characteristic of highlands materials from Apollo 16 and Apollo 14 are evidently idiosyncracies of the central nearside. Thus, they have little significance for purposes of constraining the origin of the Moon. (Auth. mod.)

E-45211

Eugster, O., **History of the paired lunar meteorites MAC88104 and MAC88105 derived from noble gas isotopes, radionuclides, and some chemical abundances,** *Geochimica et cosmochimica acta,* Nov. 1991 55(11), MacAlpine Hills Lunar Meteorite Consortium, Mar. 1990, Houston, TX, p.3139-3148, 39 refs.

The concentrations of noble gas isotopes and radionuclide activities in these two meteorites are essentially identical, proving that the two are paired. From K-40/Ar-40 dating a gas retention age of 3550 Ma is obtained, typical for lunar surface material. Probably before breccia compaction the MAC88104/5 material resided for 630 Ma at an average shielding depth of 85 g/sq cm, that is, about 50 cm below the lunar surface in the lunar regolith, as judged from the concentration of cosmic-ray produced Kr and Xe isotopes. Although this duration of lunar regolith residence is relatively long, MAC88104/5 represent immature regolith material: the concentration of solar wind-implanted noble gases are two orders of magnitude lower than those in mature lunar soil. The reason for that might be the relatively high average shielding. The Ar-40/Ar-36 ratio of the trapped component is 5.7, indicating an intermediate antiquity of the material; it is estimated that the solar wind and lunar atmospheric particles were implanted about 2000 Ma ago. The radionuclide activities allow the derivation of the exposure history of the MAC88104/5 material. (Auth. mod.)

E-45212

Nishiizumi, K., **Exposure histories of lunar meteorites: ALHA81005, MAC88104, MAC88105, and Y791197,** *Geochimica et cosmochimica acta,* Nov. 1991 55(11), MacAlpine Hills Lunar Meteorite Consortium, Mar. 1990, Houston, TX, p.3149-3155, 40 refs.

The cosmogenic radionuclides Ca-41, Cl-36, Al-26, and Be-10 in the Allan Hills 81005, MacAlpine Hills 88104, MacAlpine Hills 88105, and Yamato 791197 meteorites were measured by accelerator mass spectrometry (AMS). Mn-53 in ALHA81005 and Y791197 was measured by neutron activation. These four lunar meteorites experienced similar histories. They were ejected from near the surface of the Moon ranging in depth down to 400 g/sq cm and had very short transition times (less than 0.1 Ma) from the Moon to the Earth. A comparison of the cosmogenic nuclide concentrations in MAC88104 and MAC88105 clearly indicates that they are a pair from the same fall. (Auth.)

E-45213

Vogt, S., **Exposure histories of the lunar meteorites: MAC88104, MAC88105, Y791197, and Y86032,** *Geochimica et cosmochimica acta,* Nov. 1991 55(11), MacAlpine Hills Lunar Meteorite Consortium, Mar. 1990, Houston, TX, p.3157-3165, 53 refs.

Two out of three lunar meteorites (MAC88104/5 and Y791197) are characterized by brief transit times, less than 0.1 Ma, and moderate terrestrial ages, between 0.05 and 0.2 Ma, but were ejected from different burial depths on the Moon. Pairing (paired fall) of MAC88104/5 with Y791197 appears unlikely, as neither the terrestrial ages nor the total exposure to cosmic rays of the two meteorites agree. A joint launch (paired ejecta) of them cannot be ruled out with certainty based on the cosmogenic nuclide data. Y86032 spent 10 Ma in free space followed by 0.08-0.12 Ma in the Antarctic. The observed frequency of impacts thought to be large enough to eject matter from the Moon is >0.5 Ma. As this rate is considerably less than a calculated rate at which lunar meteorites arrive on the Earth's surface, is is inferred that each meteorite-producing impact on the Moon launches a swarm of objects that blankets the Earth's surface. The cosmogenic nuclide data indicate that many lunar meteorites lay within a few meters of the lunar surface immediately prior to ejection. These depths are shallow compared to the expected range of depths excavated by a large collision on the Moon. With the reservation that the lunar meteorites studied to date are still few in number, it is concluded that the recovery process favors material from within the topmost two meters of the lunar surface. (Auth.)

E-45214

Sears, D.W.G., **Natural thermoluminescence of meteorites: III. Lunar and basaltic meteorites,** *Geochimica et cosmochimica acta,* Nov. 1991 55(11), MacAlpine Hills Lunar Meteorite Consortium, Mar. 1990, Houston, TX, p.3167-3180, 84 refs.

Natural thermoluminescence (TL) data have been obtained for the lunar meteorite MAC88104/5 and for 65 eucrites, howardites, diogenites, and mesosiderites in order to investigate their recent thermal and radiation histories. All these meteorites have low levels of natural TL compared to chondrites, which is primarily because they display "anomalous fading" (i.e., fading by non-classical mechanisms). However, some have especially low natural TL which cannot be attributed to anomalous fading or thermal fading over especially large terrestrial ages, and which must reflect heating within the last 100,000 to 1 million y. In some cases, this heating may have been associated with shock, but in most cases solar heating at perihelia <0.8 AU may be responsible for the low TL values. The fraction of basaltic meteorites thought to have had small perihelia (about 20%) is comparable to the fraction of chondrites with low natural TL and to the fraction of observed falls and fireballs with small perihelia. This may imply ejection from the asteroid belt via similar mechanisms. (Auth.)

E-45216

Floss, C., Crozaz, G., **Ce anomalies in the LEW85300 eucrite: evidence for REE mobilization during antarctic weathering,** *Earth and planetary science letters,* Oct. 1991 107(1), p.13-24, 29 refs.

Using secondary ion mass spectrometry (SIMS), the microdistribution of Ce anomalies in the antarctic polymict eucrite LEW85300 was investigated. Ce anomalies (positive and/or negative) are present in all three of the minerals (plagioclase, pyroxene and silica) analyzed. The anomalies occur in grains from all four clasts as well as in mineral and lithic fragments, from the surrounding matrix; thus there appears to be no lithologic association. Silica, which has been heavily shocked and altered, exhibits a LREE-enriched pattern with negative Ce and Eu anomalies, consistent with a derivation of the REE from Ca-phosphate dissolution: trivalent REE are leached from the phosphates, with preferential retention of tetravalent Ce, and redeposited on silica. Pyroxene is also widely affected by REE mobilization, due to an extensive, shock-induced microcrack network along cleavage planes. A tendency for the largest Ce anomalies to occur at low LREE concentrations suggests that pyroxene itself experienced REE leaching with concomitant Ce retention. Ce anomalies are rare in plagioclase because this mineral lacks an extensive network along which REE can be mobilized. The widespread REE mobilization and evidence for other forms of weathering requires that trace element data be used cautiously, especially for antarctic eucrites. (Auth. mod.)

E-45223

Burckle, L.H., Pokras, E.M., **Implications of a Pliocene stand of *Nothofagus* (southern beech) within 500 kilometres of the South Pole,** *Antarctic science,* Dec. 1991 3(4), p.389-403, Refs. p.400-403.

Branches, stems and roots of *Nothofagus* (southern beech) were reported from the Beardmore Glacier area (Sirius Formation) some 500 km from the South Pole. The Sirius Formation is a glacially derived unit which is considered Pliocene in age. Two scenarios are considered by which a *Nothofagus* forest could flourish so close to the South Pole during the Pliocene: the disappearance of this genus from Antarctica during the early Tertiary (Oligocene) and its re-introduction during a warm Pliocene interval, or survival of *Nothofagus* in antarctic *refugia* through middle Tertiary glacial advances and its flourishing during a Pliocene warming. Excluding its occurrence in the Beardmore Glacier area, the known range of this genus in Antarctica is Cretaceous to Oligocene with some questionable occurrences in the early Miocene. The existing data do not support the *refugia* scenario. It is concluded that the occurrence of *Nothofagus* in the Beardmore Glacier area is older than Pliocene. Instead, it is suggested that it represents a relict assemblage which is probably no younger than Oligocene but which may have persisted into the early Miocene. (Auth. mod.)

E-45224

Cox, S.C., Allibone, A.H., **Petrogenesis of orthogneisses in the Dry Valleys region, South Victoria Land,** *Antarctic science,* Dec. 1991 3(4), p.405-417, Refs. p.416-417.

Granitoid gneisses intercalated with Koettlitz Group metasediments in the upper Ferrar, Taylor and Wright valleys of South Victoria Land comprise various hornblende+biotite orthogneisses and biotite orthogneisses, including the km-scale Dun and Calkin plutons. K-feldspar megacryst inclusion textures and discordant cross-cutting relationships with enclosing metasediments are interpreted as firm evidence of an intrusive origin for hornblende+biotite and biotite orthogneiss. The scale of several concordant orthogneiss bodies (including the Dun and Calkin plutons), the presence of mafic enclaves, and relict flow differentiation in hornblende+biotite orthogneiss are also compatible with a plutonic origin. Orthogneisses were emplaced prior to deformation that produced macroscopic upright tight folds about NW-trending axes. Petrography and geochemistry indicate I-type affinities for hornblende+biotite orthogneisses and the Dun Pluton. Hornblende+biotite and biotite orthogneisses (with the exception of the Dun Pluton) are part of a single petrogenetic suite, together with younger Bonney, Valhalla, and Hedley plutons. Emplacement of a continuum of I-type intrusives is envisaged which spanned Koettlitz Group deformation, and possibly caused much of the deformation. Hornblende+biotite and biotite orthogneisses are deformed precursors to the younger Bonney, Valhalla, and Hedley plutons. The Dun Pluton contains Fe-rich salitic clinopyroxene relicts and exhibits a unique geochemistry. (Auth. mod.)

E-45225

Delor, C.P., Rock, N.M.S., **Alkaline-ultramafic lamprophyre dykes from the Vestfold Hills, Princess Elizabeth Land (East Antarctica): primitive magmas of deep mantle origin,** *Antarctic science,* Dec. 1991 3(4), p.419-432, 29 refs.

Alkaline dykes tentatively dated at about 1.3 Ga cut the Vestfold Hills in a consistent N-S to N15E direction. They form a spectrum between more abundant ultramafic lamprophyres (UML) corresponding broadly to H2O-CO2-rich nephelinites, and alkaline lamprophyres (AL), representing H2O-CO2-rich basanites. Olivine (Fo46-93, averaging Fo75) is abundant only in the UML, but both types carry primary diopsidic clinopyroxene with complex zoning; amphibole (pargasite, hastingsite, kaersutite with up to 8.6% TiO2); titanian phlogopite (up to 10% TiO2); feldspars (orthoclase, anorthoclase, albite and andesine), nepheline (K-poor and Si-rich), ilmenite (up to 1% MgO and MnO), chrome titanomagnetite, and carbonate (magnesian calcite, ferroan dolomite, breunnerite). Lamprophyric peculiarities include the local coexistence of 3 feldspars, extremely Ti-rich amphiboles and micas, and the presence of globular structures and possibly primary carbonates. Some dykes carry small but abundant lherzolite xenoliths, others carry chromian diopside (1% Cr2O3) and En58-76 orthopyroxene xenocrysts. The dykes represent primitive mantle-derived magmas which have undergone varying but generally low degrees of polybaric fractionation, together perhaps with mixing of more primitive and fractionated batches, during their ascent through the crust. (Auth.)

E-45229

Blake, D.B., Zinsmeister, W.J., **New marsupiate cidaroid echinoid from the Maastrichtian of Antarctica,** *Palaeontology,* Sep. 1991 34(3), p.629-635, 17 refs.

Almucidaris durhami is a new genus and species of cidaroid echinoid from the Maastrichtian (Late Cretaceous) of Seymour I., Antarctic Peninsula. The species is unique in that the genital plates of the female are expanded and hollowed to form marsupia. The incidence of brooding in invertebrates, including echinoderms, increases with latitude and apparent stress; stressful conditions might have contributed to the evolution of *A. durhami.*

E-45235

Carrasco, M.A., Prendez, M., **Element distribution of some soils of continental Chile and the Antarctic Peninsula. Projection to atmospheric pollution,** *Water, air, and soil pollution,* 1991 Vols.57-58, p.713-722, 16 refs.

The elemental content of some soils of continental Chile and the Antarctic Peninsula are reported. The elements Al, Cr, Mn, Fe, Co, Ni, Cu, Zn, Cd and Pb were analyzed. Trace elements differed among soils. The values for Cd are greater than those reported elsewhere. The organic matter content was observed to have a great importance in the Antarctic Peninsula soils. Differences between local element contents and the mean concentration values for the terrestrial crust were found. In order to get a better determination of the origin of the aerosol, the enrichment factor used as a criterion to establish the origin of the trace elements in the atmospheric aerosols should be recalculated based on the local soil. (Auth.)

E-45257

Baroni, C., Orombelli, G., **Holocene raised beaches at Terra Nova Bay, Victoria Land, Antarctica,** *Quaternary research,* Sep. 1991 36(2), p.157-177, Refs. p.176-177.

More than 40 C-14 dates for raised beaches at Terra Nova Bay, ranging from the present to 7505 +/- 230 yr B.P., supply minimum or maximum limiting ages that bracket a relative sea level curve for this part of Victoria Land. Most samples consist of guano and penguin remains collected from abandoned nesting sites on beach deposits. Up to four C-14 dates in stratigraphic sequence have been obtained in two soil profiles. Other samples consist of marine shells collected both within and on the surface of raised beaches. All C-14 ages for organisms that lived or fed in circumantarctic waters were corrected for a large reservoir effect. The calibrated ages delimit a first relative sea level curve for Victoria Land. Rates of uplift ranged from about 10 mm/yr following deglaciation to about 2 mm/yr in the last 3 millennia. Widespread presence of Adélie penguin nesting sites suggests that Terra Nova Bay was deglaciated before 7065 +/- 250 yr B.P. (7059/6439 cal yr B.P.), when environmental conditions in the coastal area were similar to the present ones. (Auth.)

E-45259
Webb, P.N., Harwood, D.M., **Late Cenozoic glacial history of the Ross embayment, Antarctica,** *Quaternary science reviews,* 1991 10(2/3), p.215-223, Refs. p.221-223.

Knowledge of the Cenozoic terrestrial and marine glacial history of Antarctica has been developed through studies of on-land surface outcrops and subsurface drillcores; and through examination of drillcores and piston cores obtained from a variety of offshore marine geological settings. These field and laboratory endeavors have been a major target of the antarctic earth science community for more than thirty years. The Ross Sea sedimentary basins, including the Byrd basin, Wilkes and Pensacola basins, and the Transantarctic Mountains provide significant data on the Cenozoic glacial record; a record that has been traced back to at least 38 Ma (close to the Eocene-Oligocene boundary). This paper reviews the Late Cenozoic history of the Transantarctic Mountains and flanking sedimentary basins with emphasis on the debate between the 'stabilist' view of antarctic ice sheet history and the multi-glacial dynamic ice sheet model discussed. (Auth.)

E-45266
Galushkin, IU.I., Dubinin, E.P., **Thermal evolution of the lithosphere and sedimentary sequence of basins on the margin of Antarctica,** *Oceanology,* Feb. 1990 (Publ. Aug. 90) 30(1), p.64-68, 17 refs. For Russian original see 18E-42414.

The thermal history of the lithosphere of the antarctic continental margin is discussed. A thermal subsidence of oceanic lithospheric surface is used to determine the history of sedimentary basins. Time and temperature interval calculations for organic maturation of a basin near DSDP site 269 show that the principal area of oil generation occurs at a depth of 2.5-3.5 km, while the area for gas generation occurs 4.5 km below the ocean floor. (Auth. mod.)

E-45269
Scherer, R.P., **Quaternary and Tertiary microfossils from beneath Ice Stream B: evidence for a dynamic West Antarctic Ice Sheet history,** *Global and planetary change,* Oct. 1991 4(4), p.395-412, 44 refs.

Sediments that have recently been collected from beneath the West Antarctic Ice Sheet at Ice Stream B contain direct evidence of ice-free conditions in the West Antarctic interior during certain Cenozoic intervals, both prior to and subsequent to the development of grounded ice sheets in West Antarctica. The sediments contain rare but diverse microfossils that represent a wide variety of biostratigraphic ages and depositional environments. The late Pleistocene diatoms from Upstream B were deposited in the West Antarctic interior basins during a marine phase, subsequent to an ice sheet collapse, during at least one late Pleistocene interglacial. This discovery provides an indication of the complex history of the West Antarctic Ice Sheet, and calls into question some previous interpretations of ice sheet stability based on paleoceanographic proxy data. The results of this study may lend credence to the concern that global warming and rising sea levels in a "greenhouse" earth could lead to collapse of this marine ice sheet during the current interglacial period. (Auth. mod.)

E-45312
Barkov, N.I., Korotkevich, E.S., Petrov, V.N., **Stages of Late Pleistocene glaciation of Antarctica** [Etapy pozdnepleĭstotsenovogo oledeneniia Antarktidy], *Problemy arktiki i antarktiki,* 1991 Vol.66, p.289-296, In Russian with English summary. 18 refs.

Results from the analyses of the physical and chemical properties of an ice core taken from a depth of 2083 m at Vostok Station are used as the basic source of paleogeographic information. The period between 163 and 143 KA refers to the end of the penultimate Ice Age in the southern polar region called "the Ice Maximum Byrd II". In the Northern Hemisphere, according to the Alpine scale, this epoch corresponds to the Riss glaciation. The period between 120 and 13 KA is known as the Ice Age "Vostok," analogous to the Würm glaciation in the Northern Hemisphere and includes 3 maxima of the glaciation as well as 2 interstadials. The period between 13 KA and the present time corresponds to the modern Holocene Interglacial called the "Modern Glaciation Minimum." (Auth. mod.)

E-45313
Isla, F.I., **Gravel drift and wind effects on the macrotidal San Sebastian Bay, Tierra del Fuego, Argentina,** *Marine geology,* Mar. 1991 97(1/2), p.211-224, 20 refs.

In northeastern Tierra del Fuego, the Holocene mean sea-level (MSL) fluctuation reworked much pre-Wisconsin glacial drift into sand/gravel beaches and spits, and sand/mud tidal flats. For the last 7000 years, sea level has been falling. A southwards wave-induced longshore transport of sand and gravel has constructed the 17 km long El Páramo spit, which partly encloses the wide San Sebastián Bay. Semidiurnal tides with a range of up to 10 m enter the bay from the south, causing a dominance of flood currents and wave action in the southern part of the bay; ebb currents predominate in the north. This segregation of flows conditioned sedimentation and is thus responsible for the south-north transition of welded gravel ridges, sand flats, mixed flats and mud flats. Wind and wave actions from Atlantic storms infilled the southern coast of the bay, fossil and active marshes evolved, and seasonal ponds have been produced by intense deflation. On the intertidal mud flats, wind causes deflation during neap tides and silting during spring tides. North of the bay, the eastward migration of straight tidal channels or rills is conditioned by winds. The effects of strong and persistent winds from the Pacific influence not only the tidal flats, but also the gravel spit. If ocean waves induce a southward drift of gravels within the bay, the wind-induced gravel drift is to the north. During winter there are no aeolian effects over the iced tidal flats. (Auth. mod.)

E-45321
Anderson, J.B., Bartek, L.R., **High resolution seismic record of antarctic glacial history,** *Korean journal of polar research,* June 1991 2(1) (Special issue), Second International Symposium on Antarctic Science, Seoul, Korea, Sep. 17-18, 1990. [Proceedings], p.71-78, 16 refs.

The results of two high resolution seismic surveys, one in the Ross Sea and one on the northern Antarctic Peninsula shelf (including the Bransfield Basin), are presented. This work focuses on the identification of surfaces and sedimentary packages unique to these glacial settings; such features as glacial troughs, till tongues, and subglacial deltas. Examples of these features occur in both regions, and their stratigraphic occurrence aids in the reconstruction of the glacial history of the study areas. The Ross Sea is the only area in West Antarctica where drill site information provides constraints to the seismic stratigraphy. Results of this study indicate that ice sheets grounded on the continental shelf as early as late Oligocene. The Antarctic Peninsula continental shelf also has experienced several episodes of ice sheet grounding, but the timing of glacial events remains poorly constrained. (Auth. mod.)

E-45322
Kim, Y., Nam, S.H., **High resolution seismic survey of Maxwell Bay, King George Island: glacial marine sedimentation and tectonics,** *Korean journal of polar research,* June 1991 2(1) (Special issue), Second International Symposium on Antarctic Science, Seoul, Korea, Sep. 17-18, 1990. [Proceedings], p.79-86, 13 refs.

High-resolution seismic profiles in Maxwell Bay show that a trough deeper than 500 m lies at the center. The trough is U-shaped and covered by well laminated layers 30 m thick. A fault which cuts the laminated layers all the way to the top, and a volcanic intrusion, are observed in the profiles. These tectonic activities must have occurred in recent geologic times. The bottom topography rises with a step-like pattern to the northern coast; a steep slope at one side represents a series of high-angle normal faults which are related to the extensional process of Bransfield Strait. Bathymetry of the region suggests that a main glacier covered the central trough and several valley glaciers developed perpendicularly to the axis of the bay. (Auth.)

E-45324

Gonzalez-Ferran, O., **Antarctic volcanic hazard,** *Korean journal of polar research,* June 1991 2(1) (Special issue), Second International Symposium on Antarctic Science, Seoul, Korea, Sep. 17-18, 1990. [Proceedings], p.97-105, Refs. p.104-105.

Along western Antarctica, from the Scotia Arc to Balleney Is., the following zones with active Pleistocene-Recent volcanism have been recognized: Sandwich Is.; Bransfield Rift; Larsen Rift; Marie Byrd Land; Hallett and Victoria Land; and Balleney Is. In the eastern antarctic region another active volcanic area related to the volcanic system of the Kerguelen Is. (Gauss volcanic area) has been recognized. All these areas include a number of active volcanoes with recent historic eruptions. Therefore, they constitute regions with volcanic hazard, subjected to eruptive activity generating freatomagmatic explosions, avalanches (lahars) and tephra fall. The siting of scientific bases, ports and landing fields, with a dense human and logistic concentration increasing over the last decades, has contributed to a rise in the number of high risk points in case of eventual volcanic eruptions; one can cite the eruptions of 1967, 1969, and 1970 on Deception I., and the disaster they caused at the Chilean and British Stations. In order to mitigate the effects of these natural catastrophes and to inform the stations in time, a seismic telemetric network has been implemented to monitor the seismic-volcanic activity on the Bransfield Rift. It is suggested that this project should constitute an International Cooperation Program in the region, supported by all countries that have a year-round station operating in that area. (Auth. mod.)

E-45325

Jin, M.S., Lee, M.S., Kang, P.C., Jwa, Y.J., **Petrology and geochemistry of the volcano-plutonic rocks on the Barton and the Weaver Peninsula, King George Island, Antarctica,** *Korean journal of polar research,* June 1991 2(1) (Special issue), Second International Symposium on Antarctic Science, Seoul, Korea, Sep. 17-18, 1990. [Proceedings], p.107-134, Refs. p.133-134.

Volcano-plutonic rocks distributed on the Barton and Weaver Peninsulas of King George I. range in composition from basaltic through andesitic and dacitic to rhyodacitic and/or quartz-dioritic rocks, and have radiometric age of the Early Tertiary. Major and trace element geochemistry of the rocks show that they have been fractionated from a calc-alkaline magma, generated by the partial melting of old oceanic crust and/or mantle. (Auth. mod.)

E-45326

Jwa, Y.J., Park, B.K., **Geochemical comparisons on the volcanic rocks in the Antarctic Peninsula, the South Shetlands Islands and southern South America,** *Korean journal of polar research,* June 1991 2(1) (Special issue), Second International Symposium on Antarctic Science, Seoul, Korea, Sep. 17-18, 1990. [Proceedings], p.135-143, 16 refs.

Jurassic to recent magmatic activities throughout the Antarctic Peninsula, the South Shetland Is. and southern South America have changed over time in their chemical natures, but the fractionation trends, as a whole, show the intermediate between the tholeiitic and calc-alkaline trends. Different chemical natures of volcanic rocks of the regions are thought to be due to the different environments where volcanic magmas generate. High aluminum contents in Tertiary volcanic rocks on the South Shetland Is. and southern South America represent the contribution of crustal materials. The LIL/HFS elements ratios are relatively high and almost constant in Jurassic to Tertiary volcanic rocks, but become lower in the Quaternary. The high LIL/HFS elements ratios are characteristic features caused by concentration of the LIL elements due to dehydration processes with the subduction slab, and by fractionation of mineral phases containing the HFS elements from the magma. Enrichment of HFS elements and depletion of LIL elements in Quaternary volcanic rocks indicate that the Quaternary volcanic magma was generated from the depleted mantle. (Auth. mod.)

E-45327

Park, M.E., **Epithermal alteration and mineralization zoning within the stratovolcano, Barton Peninsula, King George Island,** *Korean journal of polar research,* June 1991 2(1) (Special issue), Second International Symposium on Antarctic Science, Seoul, Korea, Sep. 17-18, 1990. [Proceedings], p.145-158, 26 refs.

A stratified volcanic-arc type succession on Barton Peninsula is divided into 3 tectonic units. The volcanics are mainly represented by andesitic pyroclastic flow and surge deposits. Hypabyssal intrusions and pluton were impregnated into these rock in the Eocene. Volcanism, accompanied and followed by faulting, continued beyond the Eocene. The alteration-mineralization system is centered on a fault which was associated with explosive volcanism and subvolcanic intrusive activity. Hydrothermal wall rock alteration occurs with the iron oxide-cemented breccias and as envelopes of altered rock adjacent to vein and fault of the Barton Peninsula epithermal system. Four types of wallrock alteration are recognized in the epithermal system: prophylitic, sericitic, argillic and advanced argillic alteration. Sulfide and silver mineralization occurs with the alteration zone. The mineralized zone consists of silicified rocks and contains kaolinite, silica and native sulfur veinlet. Fine grained pyrites (or marcasites) are the principal sulfides. Fine grained sphalerites and silver sulfosalts occur as disseminations in the silicified rocks. A lead-zinc bearing quartz vein is observed in the southwest part of the Barton Peninsula. Limited fluid inclusion data are obtained from the quartz vein. Two types of primary fluid inclusions are recognized in this study, ranging from less than 10 to greater than 30 microns in size. Primary liquid-rich type fluid inclusions homogenize at 194-345 C in quartz and 184 C in sphalerite. (Auth. mod.)

E-45328

Kim, W.H., Kim, M.O., Park, B.K., **Diatoms in the Holocene sediments of Maxwell Bay, King George Island, Antarctica,** *Korean journal of polar research,* June 1991 2(1) (Special issue), Second International Symposium on Antarctic Science, Seoul, Korea, Sep. 17-18, 1990. [Proceedings], p.159-177, Refs. p.173-175.

Diatom floras are analyzed in core sediments collected in Maxwell Bay during the summer of 1988/89. All sediments contain well-preserved and diverse diatoms indicating that the sediments have been deposited during the Holocene and that productivity has been very high. The ratios of *Nitzschia curta/N. kerguelensis* indicate that middle to lower parts of the core sediments were deposited during a warmer period than today. Based on the core length and temperature of the period, the sedimentation rate of Maxwell Bay is inferred to be 50 cm/1,000 yrs. The genus *Nitzschia* comprises more than 50% of the diatom populations and increases in proportion to depth. Dominant species are *N. kerguelensis, N. curta, Thalassiosira antarctica,* and *T. gracilis.* (Auth.)

E-45329

Chun, H.Y., Chang, S.K., **Study on the gymnospermous fossil woods from the King George Island,** *Korean journal of polar research,* June 1991 2(1) (Special issue), Second International Symposium on Antarctic Science, Seoul, Korea, Sep. 17-18, 1990. [Proceedings], p.179-185, 10 refs.

Several pieces of permineralized fossil woods have been examined and classified into the Araucariaceae-like plants. These woods have been named *Dadoxylon* sp. and indicate an Early Tertiary age. Their occurrence suggests a cold habitat in the high altitude vegetation and interglacial areas. (Auth. mod.)

E-45366

Suetova, I.A., Ushakov, S.A., **New morphometric characteristics of bedrock Antarctica after deglaciation,** *Akademiia nauk SSSR. Transactions. Earth science sections,* May-June 1988 (Pub. Aug. 89) 300(4), p.198-200, 3 refs. For Russian original see 17E-40076.

Based on results of detailed radar sounding, the authors were able for the first time to calculate and map the isostatic uplift of Antarctica after removal of the ice sheet (deglaciation). Summing the present surface area of bedrock Antarctica and the amount of its isostatic uplift after deglaciation then allowed the reconstructed bedrock relief in its isostatic equilibrium state to be mapped for the first time. Morphometric characteristics of the continent at present and reconstructed after deglaciation show that the average elevation of Antarctica within its geographic boundary (970 m) is fairly high for its small area as compared with other continents.

E-45368

Fröhlich, F., Gély, J.P., Perseil, E.A., **Mineralizations related to rifting on the Kerguelen-Heard Plateau (Indian Ocean)** [Minéralisations liées à un rift sur le Plateau de Kerguelen-Heard (Océan Indien)], *Académie des sciences, Paris. Comptes rendus. Série II,* July 4, 1991 313(1), p.69-75, In French with abridged English version. 14 refs.

Mineralized rocks, including boulders and breccias with massive zeolitizations, chalcedony, phosphates and barite were sampled on the SE edge of the Kerguelen-Heard Plateau. The breccia cement consists of mixed zeolites and Fe-Mn oxy-hydroxides. Taking into account the geochemical parameters of the minerals, and their relationships with the sedimentary and geodynamical evolution of the Plateau, it is shown that they were formed during the Middle Eocene, and that they originated from hydrothermal processes. These events are related to the initial stages of expansion at the SE Indian Ridge.

E-45393

Björck, S., **Stratigraphic and paleoclimatic studies of a 5500-year-old moss bank on Elephant Island, Antarctica,** *Arctic and alpine research,* Nov. 1991 23(4), p.361-374, 43 refs.

Analyses of a core from the deepest known moss peat bank in Antarctica, on Elephant Island, South Shetlands, show that this *Chorisodontium aciphyllum*-dominated bank began to grow ca. 5500 C-14 yr BP. Combined with other studies in the region, the present study indicates more extensive glaciation before 5000 to 6000 BP than today on some of the South Shetland Is. The main hypothesis is that these frozen moss banks contain important paleoclimatic information. The stratigraphic parameters analyzed included degree of humification, organic and mineral matter content, bulk density, chronology, volumetric growth and organic accumulation rates, and finally magnetic analyses to detect tephra horizons. A discussion of the interrelationships between these parameters is followed by theoretical calculations of annual net primary productivity combined with multivariate analysis of the data set. The data suggest that the periods with the coldest summers (and possibly also winters) prevailed at the earliest stage of the moss bank development, at ca. 3500 BP, and 2500 BP. (Auth. mod.)

E-45403

Behrendt, J.C., **Geophysical studies of the west antarctic rift system,** *Tectonics,* Dec. 1991 10(6), p.1257-1273, Refs. p.1272-1273.

The west antarctic rift system extends over a 3000 x 750 km, largely ice covered area from the Ross Sea to the base of the Antarctic Peninsula, comparable in area to the Basin and Range and the East African rift system. A spectacular rift shoulder scarp along which peaks reach 4-5 km maximum elevation marks one flank and extends from northern Victoria Land-Queen Maud Mountains to the Ellsworth-Whitmore-Horlick Mountains. The rift shoulder has maximum present physiographic relief of 5 km in the Ross Embayment and 7 km in the Ellsworth Mountains-Byrd Subglacial Basin area. The Transantarctic Mountains part of the rift shoulder (and probably the entire shoulder) has been interpreted as rising since about 60 Ma, at episodic rates of about 1 km/m.y., most recently since mid-Pliocene time, rather than continuously at the mean rate of 100 m/m.y. The rift system is characterized by bimodal alkaline volcanic rocks ranging from at least Oligocene to the present. These are exposed asymmetrically along the rift flanks and at the south end of the Antarctic Peninsula. (Auth. mod.)

E-45404

Storey, B.C., Alabaster, T., **Tectonomagmatic controls on Gondwana break-up models: evidence from the proto-Pacific margin of Antarctica,** *Tectonics,* Dec. 1991 10(6), p.1274-1288, Refs. p.1287-1288.

Geochemical and isotopic data are presented that suggest the existence of a large Middle Jurassic subduction-related magmatic province common to both the Antarctic Peninsula and southern South America. It is argued that during the initial stages of Gondwana breakup, Pacific margin magmas were derived from an enriched lithospheric mantle source similar to that for the contemporaneous within-plate Ferrar-Tasman suite. Enriched lithospheric initial-rifting magmas were succeeded, in at least part of the Rocas Verdes Basin, by transitional early drift magmas and then by entirely asthenospheric mid-ocean ridge basalt (MORB) magmas representing lithospheric rupture and seafloor spreading. A plate interaction model is proposed for the initial stages of Gondwana breakup relating the broad zone of lithospheric mantle melting to a reduction in plate boundary forces. The change from Gondwanide compression to lithospheric extension in the Jurassic is linked to a change from shallow to steeply-dipping subduction and to a slowing of subduction rates caused possibly by a decreasing age of the subducting plate. Ridge-trench interaction may have followed subduction of young, hot oceanic lithosphere, possibly causing a temporary cessation of subduction and a further reduction in plate boundary forces, thus facilitating breakup. (Auth.)

E-45444

Poscher, G., **Sedimentary and petrographic characterization of diamictites from the Beacon Super-Group, Kottas-Berge, Heimefront Range (Antarctica)** [Sedimentpetrographische Charakterisierung von Diamiktiten der Beacon Super-Group, Kottas-Berge, Heimefrontfjella (Antarktis)], *Zeitschrift für Gletscherkunde und Glazialgeologie,* 1989 25(1), p.1-16, In German with English summary. 33 refs.

Examined samples derived from the basal section of the permo-carbon sediments which belong to the Beacon Super-Group (Schivestolen locality, NE-Heimefrontfjella) show attributes of a glacial environment. Because of the clasts and the mineralogical composition that signify a basement, the compositional maturity of the sediments must refer to semiarid climate conditions. The textural results and grain statistics indicate till material. Quartz surface textures and morphologies with indications of glacial environments were also found. As detailed lithofacial fieldwork and sampling are still incomplete, the present results are merely tentative. (Auth. mod.)

E-45446
Ten Brink, U., **Rift flank uplifts and hinterland basins: comparison of the Transantarctic Mountains with the Great Escarpment of Southern Africa,** *Journal of geophysical research,* Jan. 10, 1992 97(B1), p.569-585, Refs. p.584-585.

Uplifted rift margins are a common feature of continents and oceans. Two variants of rift flank morphologies have been recognized: one in which the topography warps down from an inland high toward the continental margin, and one where the topographic peak lies close to the continental margin. The Great Escarpment of southern Africa and the Transantarctic Mountains are examples of the first and the second variants of rift flanks, respectively. Both rift flanks are bordered on their landward side by broad continental basins: the Kalahari and the Wilkes hinterland basins. If these basins are interpreted as flexural "outer lows" that deepen in unison with the uplift of the rift flanks, the lithosphere on the uplifted side is very rigid in both cases (elastic thickness Te of 100 + /- 20 km for southern Africa and 110 + /- 20 km for East Antarctica). It is suggested that the variation in rift flank morphology is caused by the isostatic response to uplift forces of elastic plates sharing different boundary conditions. Detailed modeling of topography, gravity, geological markers, and the locations of depocenters suggests that lithospheric rigidity decreases under the Transantarctic Mountains, whereas in southern Africa the decrease occurs not under the Great Escarpment but far seaward under the continental shelf and slope. If the distribution of lithospheric rigidity is indicative of the thermal regime of the lithosphere, then uplifted rift flanks are not always underlain by a thermal anomaly. This and other geological evidence indicate that a single mechanism cannot explain the uplift of both the antarctic and the African margins. (Auth. mod.)

E-45449
Wu, Y.G., Zhao, J.L., **Determination of rare earths and other trace elements in samples of Antarctica by neutron activation analysis,** *Journal of radioanalytical and nuclear chemistry,* Oct. 1991 151(2), p.345-355, 9 refs.

The concentrations of rare earth elements (REE) and other trace elements have been determined in samples from Antarctica by Instrumental Neutron Activation Analysis (INAA). The samples were collected from West Lake, near the Great Wall Station, and include sediments, residual plants, rock and soil taken from the bottom of the lake to 3.4 m depth. The analysis was performed with the NAA reactor using both short and long irradiations with Ko standardization. Nine rare earth elements La, Ce, Nd, Sm, Eu, Tb, Dy, Yb, and Lu, as well as other trace elements As, Au, Ba, Br, Co, Cr, Hf, Sc, Se, Th, V, and Zn have been determined. The concentrations and distribution patterns of REE in the samples are given. (Auth.)

E-45453
Rowell, A.J., Rees, M.N., Evans, K.R., **Evidence of major Middle Cambrian deformation in the Ross orogen, Antarctica,** *Geology,* Jan. 1992 20(1), p.31-34, 32 refs.

Long-lived polyphase tectonism in the Cambrian history of the Ross orogen is demonstrated by recent stratigraphic studies in both the central and Weddell Sea segments of the Transantarctic Mountains. It is postulated that strong early Middle Cambrian deformation preceded a more widely recognized Late Cambrian-Early Ordovician period of contraction and magmatism. These Middle Cambrian movements were locally the principal phase of orogenic deformation. They profoundly altered sedimentation patterns along the antarctic margin, so that in the Weddell Sea region, when carbonate platform sedimentation resumed, the platform margin was reestablished far oceanward of its Early Cambrian location. Intra-Cambrian tectonism along the paleo-Pacific margin of Gondwana was not confined to its antarctic segment; comparable activity recently has been described from Australia and is known from South America. These movements may be related to amalgamation of East and West Gondwana. (Auth.)

E-45454
Boucot, A.J., Moores, E.M., Dalziel, I.W.D., **Comment and reply on "Southwest U.S.-East Antarctic (SWEAT) connection: a hypothesis" and "Pacific margins of Laurentia and Antarctica-Australia as a conjugate rift pair: Evidence and implications for an Eocambrian supercontinent,** *Geology,* Jan. 1992 20(1), p.87-88, 19 refs. For the items under discussion see 19E-44160 and 19E-44481.

Moores and Dalziel recently presented a hypothesis that during the Paleozoic, Antarctica and the U.S. southwestern cordillera showed evidence of being near enough to each other to merit being judged a geological fit on the basis of having sufficient similarities in structural features in both places. Boucot disputes the hypothesis, saying that the likelihood of this proximity occurring is negligibly small; Moores and Dalziel counter his arguments.

E-45455
Batchelor, J.D., Sears, D.W.G., **Thermoluminescence constraints on the metamorphic, shock, and brecciation history of basaltic meteorites,** *Geochimica et cosmochimica acta,* Dec. 1991 55(12), p.3831-3844, 101 refs.

Induced thermoluminescence measurements have been performed on 18 eucrites, 13 howardites, 6 diogenites, and 15 mesosiderites in order to help clarify their metamorphic, shock, and brecciation history. The TL sensitivities of the basaltic meteorites reflect their bulk composition, and the effects of (1) igneous processes (diogenites and mesosiderites) and (2) the mixing of materials of different compositions (e.g., diogenitic and eucritic) during brecciation (howardites) can be observed. Two previously unclassified mesosiderites, LEW 87006 and EET87500, are assigned to class A and B, respectively, on the basis of their TL sensitivities. The eucrites show a 15-fold range of TL sensitivities, which correlate with petrographic indicators of metamorphic intensity. Therefore a petrologic type scale is described based on TL and petrographic evidence, where the least metamorphosed eucrites are type 1 and most equilibrated are type 8. There is no evidence for two discrete metamorphic environments corresponding to the equilibrated and unequilibrated eucrites. Other antarctic meteorites are also included in this study. (Auth. mod.)

E-45461
Craig, H., Wharton, R.A., Jr., McKay, C.P., **Oxygen supersaturation in ice-covered antarctic lakes: biological versus physical contributions,** *Science,* Jan. 17, 1992 255(5042), p.318-321, 7 refs.

Freezing in ice-covered lakes causes dissolved gases to become supersaturated while at the same time removing gases trapped in the ablating ice cover. Analysis of N2, O2, and Ar in bubbles from Lake Hoare ice shows that while O2 is about 2.4 times supersaturated in the water below the ice, only 11% of the O2 input to this lake is due to biological activity: 89% of the O2 is derived from meltwater inflow. Trapped bubbles in a subliming ice cover provide a natural "fluxmeter" for gas exchange. In Lake Hoare as much as 70% of the total gas loss may occur by advection through the ice cover, including about 75% of the N2, 59% of the O2, and 57% of the Ar losses. The remaining gas fractions are removed by respiration at the lower boundary (O2) and by molecular exchange with the atmosphere in the peripheral summer moat around the ice. (Auth.)

E-45465

Liu, X.H., Zheng, X.S., Molan, E., **Review on the geotectonic division and Gondwana movement, Antarctica,** *Antarctic research (Chinese edition),* 1991 3(2), p.1-9, In Chinese with English summary. Refs. p.8-9.

Based on the results of former researchers, this paper summarizes the Gondwana movement and the tectonic settings and evolution of Antarctica. The main problems and trends of geological research in Antarctica are discussed. (Auth.)

E-45466

Zheng, X.S., **Volcanic geology, petrological characteristics and the formation and evolution of the Tertiary volcanic rocks from the Great Wall Station area, King George Island, West Antarctica,** *Antarctic research (Chinese edition),* 1991 3(2), p.10-108, In Chinese with English summary. Refs. p.102-106.

Results of field investigations and laboratory research carried out by Chinese geologists at the Great Wall Station since 1984 are summarized as follows: the Tertiary volcanic rocks on Fildes Peninsula are subdivided into 2 litho-stratigraphic formations, the Great Wall Formation (GWF) and the Fossil Formation (FF). The GWF, composed of 2 members, consists mainly of lavas and breccias, with some agglomerates indicating the beginnings of the volcanic activity. FF, also composed of 2 members, consists of tuffaceous sandstone, conglomerate, plant-bearing tuffaceous, siltstone and tuffaceous mudstone. Research on plant fossils, spores and pollens fully proves that a part of FF was formed in Early Tertiary. The isotope chronological data suggest that the volcanic rocks on the entire Peninsula are Tertiary. However, the age ranges of GWF are Paleocene to Oligocene, and those of FF are Eocene to Early Miocene. The eruptive centers of the Peninsula gradually migrated from the western to the eastern coast, and the subvolcanic intrusives were regularly distributed along a series of NNW-SSE trending faults. All of these were formed in 2 stages of volcanic activity: from Paleocene to Eocene or Early Miocene. (Auth. mod.)

E-45467

Zheng, X.S., Molan, E., **Volcanic geology and petrological characteristics of the Stansbury Peninsula, Nelson Island, West Antarctica,** *Antarctic research (Chinese edition),* 1991 3(2), p.109-125, In Chinese with English summary. 17 refs.

The Stansbury Peninsula of Nelson I., a neighbor of Fildes Peninsula, is covered with basaltic, basalt-andesitic lavas and breccias as well as fossiliferous volcanic-sedimentary clastic rocks. The volcanic rocks and volcanic-sedimentary clastic rocks are the products of 2 stages of volcanism and can be stratigraphically subdivided into 3 members. The breccias, interbedding basaltic, basal-andesitic lavas and breccias, formed successively, and are comparable to those of Fildes Peninsula. Before the end of this stage some subvolcanic intrusives appeared. The similar development of volcanic strata, and the discovery of plant fossils, suggest that the volcanic rocks on Stansbury Peninsula and on Fildes Peninsula resulted from the same regional volcanism in the Early Tertiary. The faults on the peninsula parallel to the Fildes Strait Fault are the main structure and control the distribution of subvolcanic intrusives in the peninsula. The petrological characteristics of volcanic rocks from the Stansbury Peninsula suggest that the lavas and subvolcanic intrusives are basically basaltic and basalt andesitic. (Auth. mod.)

E-45468

Zhu, M., Molan, E., Liu, X.H., Zheng, X.S., **Isotope age of the volcanic rocks and the correlation of stratigraphy in the Fildes Peninsula, King George Island, West Antarctica,** *Antarctic research (Chinese edition),* 1991 3(2), p.126-135, In Chinese with English summary. 25 refs.

The ages of volcanic rocks from Fildes Peninsula have been determined by the K-Ar, Ar-39/Ar-40, and Rb-Sr methods, showing the following: the age range of volcanism on the Peninsula is from Late Paleocene to Early or Mid Miocene; the forming time of the volcanic rocks of the Jasper Hill Member is Late Paleocene; the volcanic rocks of the Agate Beach Member are the product of volcanic activities during Early Eocene; the geological age of the Fossil Hill Member is approximately from Mid Eocene to Early Oligocene. (Auth. mod.)

E-45487

Jacobs, J., **Structural evolution and cooling history of the Heimefrontfjella Mountains (Western Dronning Maud Land / Antarctica)** [Strukturelle Entwicklung und Abkühlungsgeschichte der Heimefrontfjella (Westliches Dronning Maud Land/Antarktika)], *Berichte zur Polarforschung,* 1991 No.97, 141p., In German with English summary. efs. p.128-133.

The Heimefrontfjella metamorphic complex in western Dronning Maud Land is part of a Kibaran Mobile Belt, which correlates with the Namaqua-Natal Belt (S. Africa) and possibly with the Kirwanveggen-Sverdrupfjella Belt and the Mozambique Belt. The structural development during the Kibaran orogeny and the cooling and the uplift history of the Heimefrontfjella are investigated in this thesis. Kibaran structures indicate that the Heimefrontfjella metamorphic complex developed within an E-W oriented compressional field. Early structures are large, flat lying isoclinal folds, sheath folds and eastward propagating thrusts (D1) that caused inverse metamorphic stacking. During this stage a several km wide, steep, NE trending dextral transpression developed, causing the juxtaposition of granulite facies rocks in the NW of the shear zone and amphibolite facies rocks in the SE. The dextral transpression is associated with rational tectonics and a pronounced -Schlingen'-tectonic of the nonmylonitized areas in the vicinity of the shear zone. Areas not affected by the large shear zone are folded along N or NNE trending fold axes with dominantly SE facing folds (D2). K/Ar and Ar-40/Ar-39 data of muscovite and biotite fall into two age groups. Most samples revealed cooling ages of about 500 Ma. Samples from three localities on the NW side of the shear zone yielded ages of 800 to 1000 Ma. All apatite fission-track ages fall into two groups, one having ages of around 100 Ma (Upper Cretaceous), the other having older ages of 130 to 220 Ma. (Auth.mod.)

E-45488

Sandgren, P., Zale, R., **Late Holocene tephrochronology of the northern Antarctic Peninsula,** *Quaternary research,* Nov. 1991 36(3), p.322-328, 21 refs.

Andesitic and basaltic andesitic tephra layers are abundant in Holocene deposits from the Antarctic Peninsula. Visually discernible tephra horizons occur in three lakes on Livingston I. Tephra in two other lakes and in a moss bank on Elephant I., with very low ash concentrations, were detected magnetically. Deception I. is the most likely volcanic source for the tephra. With direct C-14 dating, age/-depth curves, and cross-correlations at least 14 tephra horizons dating to between ca. 4700 and 250 yr B.P. were identified and now form the basis for a preliminary regional tephrochronology that will be a valuable dating tool for investigating the Holocene climatic history of Antarctica. (Auth.)

E-45512
Young, G.M., **Geologic record of glaciation: relevance to the climatic history of earth,** *Geoscience Canada,* Sep. 1991 18(3), p.100-108, 89 refs.

The geologic record suggests that the surface of the planet has had a remarkably stable thermal history. This stability is remarkable because of an inferred 30% increase in solar luminosity since Early Archean time. The glacial record provides some of the best evidence of thermal perturbation. The major cause of glaciation may be the periodic reduction of atmospheric CO2, which is linked, *via* plate tectonics, to the weathering cycle. Early Proterozoic glaciation may have occurred because of the combination of enhanced weathering of new cratons, and the faint early sun. Associated highly weathered rocks may reflect the high CO2 content of the atmosphere. Late Proterozoic glaciation is explained as being due to lowering of atmospheric CO2 levels by extreme weathering of a supercontinent at low latitudes. Most Phanerozoic glaciation was caused by the combined effects of weathering of an elevated supercontinent (Pangea) and polar positioning. The Cenozoic glaciation may be related to high latitudes of some continental masses and reduced CO2 levels due to enhanced weathering of the continents, which become emergent as the Atlantic Ocean floor ages, cools and sinks. In the short term, the "Little Ice Age" climatic cycle suggests warming for about the next 1,000 years. Global cooling should follow as the Earth descends into the next severe glaciation predicted by Milankovitch theory. Anthropogenic contribution to the greenhouse effect should enhance the short-term warming trend. The repeated cycle of Cenozoic glaciations will end with the initiation of subduction along the Atlantic margins. (Auth. mod.)

E-45541
Alekseev, V.A., **Radiation history of antarctic and non-antarctic meteorites,** *Soviet system research,* Sep. 1991 25(2), p.172-181, Translated from Astronomicheskiĭ vestnik, Mar.-Apr., 1991. 48 refs.

Radiation age distributions of non-antarctic and antarctic H-chondrites are studied. Peaks are found in the distributions corresponding to ages of 6.3 Myr for non-antarctic meteorites and 6.4 Myr for antarctic. The similarity in radiation ages probably indicates an origin of both non-antarctic and antarctic H- chondrites from a single parent body. The data obtained can be explained by the proposal of approximately constant frequency of incidence on earth of L- and LL-chondrites, while the frequency of incidence of H-chondrites changed over time, being at a maximum approx. n x 10,000 yr ago. This is the cause of the lower mean terrestrial age of antarctic H-chondrites (40 kyr) as compared to the greater mean terrestrial age of antarctic L- and LL-chondrites (230 kyr). (Auth. mod.)

E-45548
Anderson, J.B., ed, Ashley, G.M., ed, **Glacial marine sedimentation; paleoclimatic significance,** *Geological Society of America. Special paper,* 1991 No.261, 232p., Refs. passim. For individual papers see 46-2173 through 46- 2186 or E-45550 through E-45552 and F-45549.

The chapters in this volume deal with the general topic of glacial marine sedimentation and stem from a symposium held at the 1988 Geological Society of America annual meeting in Denver. An objective of the symposium was to attempt to identify sedimentary criteria and facies models that can be used to characterize the glacial-climatic setting of ancient sequences. Four of the papers presented are pertinent to Antarctica.

E-45550
Bartek, L.R., Anderson, J.B., **Facies distribution resulting from sedimentation under polar interglacial climatic conditions within a high-latitude marginal basin, McMurdo Sound, Antarctica,** *Geological Society of America. Special paper,* 1991 No.261, Glacial marine sedimentation; paleoclimatic significance. Edited by J.B. Anderson and G.M. Ashley, p.27-49, 61 refs.

A detailed study of cores and high-resolution seismic data collected in McMurdo Sound was conducted to improve understanding of the facies architecture resulting from sedimentation under polar interglacial conditions. Sedimentary sequences deposited within a marginal basin, under polar interglacial and temperate glacial regimes, can be distinguished by the presence of a diverse array of facies and an absence of thick and widespread clayey silt facies in the polar interglacial deposits. Thirteen facies have been observed in the cores recovered from polar interglacial deposits in McMurdo Sound. Sedimentation on the eastern side of the sound is characterized by deposition of sediment gravity flow deposits. Thickly bedded turbidites, cohesionless debris flows, and density- modified grain flows have been deposited on and at the base of the eastern slope of the sound, while thinly bedded, coarse-grained, and fine-grained distal turbidites occur in the central basin. Within the Erebus Basin, sedimentary deposits consist primarily of diatomaceous ooze and mud, and coarse-grained ice-rafted debris. The facies of the basin also show an intertonguing relationship with the sediments of the eastern and western slopes of the sound. Sedimentation on the western slope of McMurdo Sound is dominated by deposition of ice-rafted eolian debris from the south; primary eolian deposition; turbidites with sources on the western shelf and slope; and a minor amount of ice-rafted eolian debris from the west. Deposition of ice-rafted debris from the west and coarse ice-rafted debris from the McMurdo Ice Shelf comprise the primary modes of sedimentation on the upper portion of the western slope and the western shelf. (Auth. mod.)

E-45551
Matsch, C.L., Ojakangas, R.W., **Comparisons in depositional style of "polar" and "temperate" glacial ice; Late Paleozoic Whiteout Conglomerate (West Antarctica) and late Proterozoic Mineral Fork Formation (Utah),** *Geological Society of America. Special paper,* 1991 No.261, Glacial marine sedimentation; paleoclimatic significance. Edited by J.B. Anderson and G.M. Ashley, p.191-206, 51 refs.

Two thick sequences of ancient glacial and glacial marine rocks, the late Proterozoic Mineral Fork Formation of Utah and the Late Paleozoic Whiteout Conglomerate of West Antarctica, reflect similarities and differences in temperature regimes of the glacial delivery systems, climatic settings in the zones of ablation, and nature of the glacier interfaces with the depositional environments. Both units attain thicknesses of about 1,000 m and both are segments of widely distributed glaciogenic deposits covering thousands of sq km. They appear to represent significant erosion of platformal areas beneath basal ice at or near its melting point. In the Mineral Fork Formation, facies patterns indicate supraglacial melt-out, sediment gravity flow, and deposition from meltwater streams, all characteristics of glacier ice where the climate is subpolar or temperate in the zone of ablation. In contrast, the Whiteout Conglomerate lacks facies indicative of supraglacial melting; the absence of meltwater- generated fluvial and plume deposits is especially striking. Rather, subglacial melt-out from grounded ice and basal melting of ice shelves and perhaps icebergs, all accompanied by vertical settling, are indicated. Lateral changes represent a regional transition from grounded marine-based glaciers at the pressure melting point in the basal zone to a shelf of polar ice, warmed sufficiently at the base to release sediment there by melting as well as by iceberg calving. (Auth. mod.)

E-45552
Anderson, J.B., Ashley, G.M., **Glacial marine sedimentation; paleoclimatic significance; a discussion,** *Geological Society of America. Special paper,* 1991 No.261, Glacial marine sedimentation; paleoclimatic significance. Edited by J.B. Anderson and G.M. Ashley, p.223-226, 28 refs.

Studies from modern environments of the Arctic and Antarctica suggest that, in general, the extremes of "polar" and "temperate" glacial marine sediments can be differentiated, but by using glacial marine deposits and associated geomorphologic features, not subglacial deposits. These differences are manifested in the sedimentary records of Paleozoic and late Precambrian sequences, indicating that paleoclimatic information can be derived from these rocks. Studies of Quaternary and Cenozoic deposits reveal that temperate, subpolar, and polar sedimentary facies may occur over a wide spectrum of latitudes. Thermal characteristics of ice sheets are a function of climate-driven mass balance, which would not be expected to have remained fixed at specific latitudes throughout glacial/interglacial cycles. Thus, the conceptual (thermal) models of ice sheets, warm-based (temperate) versus cold-based (polar- subpolar), should not be directly correlated with the climate regimes existing in present-day temperate and polar latitudes.

E-45576
Harley, S.L., Green, D.H., **Structural and chemical processes in granulite metamorphism; the Rauer Group and Brattstrand Bluffs region, Prydz Bay,** 1991-1992 Australian Antarctic Research Program. Antarctic Treaty exchange information: Supplement A to particulars for ANARE, Kingston, Tasmania, 1991, p.15-18, 12 refs.

A project is proposed to document and analyze the structural, metamorphic and geochemical features of reworked Archaean (2,500 Ma or older) basement in the generally late Proterozoic (around 1,000 Ma) Rauer Group; to compare this reworked basement with potentially reworked 2,500 Ma gneisses in the southernmost parts of the Vestfold Hills, including the use of mafic dyke sequences as indicators of the extent and nature of overprinting metamorphism; to evaluate the role of fluids, particularly the significance of CO2, in the widespread partial melting of metasediments (e.g. Brattstrand Bluffs) in the late Proterozoic granulite metamorphism; and to evaluate models for generating low-pressure high-temperature granulites through documentation, by way of stable isotopic studies, of any external fluid sources in the Proterozoic metamorphism.

E-45577
Stone, J.O.H., Bird, M.I., **Uplift and exposure history of the Vestfold Hills,** 1991-1992 Australian Antarctic Research Program. Antarctic Treaty exchange information: Supplement A to particulars for ANARE, Kingston, Tasmania, 1991, p.33-37, 2 refs.

A project is proposed to establish a detailed history of deglaciation, isostatic uplift and sea-level change for the Vestfold Hills since the last glacial maximum. The project will compare cosmic ray exposure-ages of glaciated pavements and emergence (isolation from the sea) ages for Vestfold Hills lakes. Exposure ages will be measured with cosmic ray produced Al-26, Cl-36 and He-3, to an accuracy of better than 10%, at key sites in the area. Emergence ages will be measured by C-14 dating of the marine-lacustrine transition in lake sediment cores; to recover and date lake-sediment cores from the Vestfold Hills; and to provide an experimental basis for future work on dating antarctic geomorphological features with cosmogenic isotopes. Further trial cosmogenic isotope studies are planned, the first of which will be dating of moraine boulders from the Lambert Glacier.

E-45598
Wand, U., Strauch, G., **Stable isotope geochemistry of antarctic salt efflorescences,** *Isotopenpraxis,* 1990 26(12), p.573-576, With German summary. 23 refs.

Salt efflorescences consisting of gypsum sampled mainly in the Schirmacher Oasis, East Antarctica, have been analyzed for the isotopic composition of the water of crystallization and of the sulphate-sulphur. For comparison, a few samples from other antarctic locations (Guettard Range, Prince Charles Mts., Insel Mts.) were included in the study. The isotopic variations of the water of crystallization of secondary gypsum and the calculated isotopic composition of the mother solution reflect the local climatic conditions during the precipitation of the efflorescences. Through this method it is possible to obtain qualitative information about the climatic conditions prevailing in a geographic region. (Auth. mod.)

E-45628
Syvitski, J.P.M., **Towards an understanding of sediment deposition on glaciated continental shelves,** *Continental shelf research,* Aug.-Oct. 1991 11(8-10), Canadian Continental Shelf Seabed Symposium, Dartmouth, Nova Scotia, Oct. 2-7, 1989. Proceedings. Edited by C.L. Amos and M. Collins, p.897-937, Refs. p.932-937.

In this paper a simple vertical stratigraphic sequence of Quaternary deposits is recognized on 20 glaciated shelves from around the world reflecting the transition from the most recent glacial to interglacial period. This sequence includes some or all of the following: ice-contact (ice-deposited and/or ice-loaded) sediments; ice-proximal sediments; ice-distal sediments; paraglacial coastal sediments; and post-glacial sediments. Typically, the sequence overlies sedimentary rocks on the outer shelf and a mixed bedrock basement on the inner shelf. The relative volume of these deglacial units provides important clues for the reconstruction of ice sheet dynamics. Outstanding seismostratigraphic problems include: distinguishing ice-loaded glacial-marine sediments from subglacially deposited till; distinguishing till from other ice-contact deposits such as grounding-line fans; and distinguishing till from non-glacial debris flow deposits. The incorrect identification of till provides poor data control on ice sheet reconstruction, ice sheet properties and dynamics, especially as related to sediment transport. (Auth. mod.)

E-45690
Goodge, J.W., Dallmeyer, R.D., **Ar-40/Ar-39 mineral age constraints on the Paleozoic tectonothermal evolution of high-grade basement rocks within the Ross Orogen, Central Transantarctic Mountains,** *Journal of geology,* Jan. 1992 100(1), p.91-106, 72 refs.

To resolve certain geological disparities, Ar-40/Ar-39 ages were determined for hornblende and muscovite from several lithotectonic subunits of the Nimrod Group exposed in the Miller Range. These rocks display ductile deformation fabrics that formed prior to intrusion of ca. 500 Ma post-kinematic granitic plutons. Hornblende concentrates from eight gneiss samples in the Miller Range display internally discordant Ar-40/Ar-39 apparent age spectra due to variable intracrystalline contamination with extraneous argon components. Ar-36/Ar-40 vs. Ar-39/Ar-40 isotope correlations are generally well defined and yield ages between ca. 525 and 487 Ma. Two muscovite concentrates from mica schist samples in the Miller Range record plateau ages of 508 and 486 Ma, which are interpreted to date cooling through temperatures required for intracrystalline retention of argon. The Ar-40/Ar-39 data indicate that conventional K-Ar dates previously reported for hornblende from the Miller Range probably have no geologic significance because of the widespread presence of extraneous argon. They cannot, therefore, be regarded as dating any "pre-Ross" event(s). Intracrystalline argon systems in samples from this study appear to have been completely rejuvenated during granite emplacement associated with the Ross orogeny. Structural fabric elements were partially annealed in many dated Nimrod Group samples, likely reflecting contact effects imposed by emplacement of post- tectonic granite plutons at ca. 500 Ma. (Auth. mod.)

E-45693

Ricci, C.A., ed, Meeting on Earth Science in Antarctica, Siena, Sep. 27-28, 1988, **Proceedings,** *Società Geologica Italiana, Rome. Memorie,* 1988 Vol.43, 205p., With Italian summaries. Refs. passim. For individual papers see C-45705, E-45694 through E-45704, E-45707, L-45706 and L-45708.

The 2nd meeting on Earth Science in Antarctica, organized with the sponsorship of the Programma Nazionale di Ricerche in Antartide (PNRA), was held in Siena on Sep. 27-28, 1988. The proceedings of the meeting are herewith published as a special issue of Memorie della Società Geologica Italiana. The present volume contains 16 papers grouped according to the lines of research promoted by the Italian earth scientists involved in the PNRA: regional geology, petrology of the crystalline basement, volcanology and geothermics, geomorphology and glacial geology, and geophysical observations.

E-45694

Palmeri, R., Talarico, F., **Contrasting petrological features between garnet- cordierite-biotite paragneisses from Black Ridge and from Cape Sastrugi, Deep Freeze Range (North Victoria Land, Antarctica),** *Società Geologica Italiana, Rome. Memorie,* 1988 Vol.43, Meeting on Earth Science in Antarctica, Siena, Sep. 27-28, 1988. Proceedings, p.33-48, With Italian summary. 20 refs.

High grade paragneisses and migmatitic gneisses which outcrop at Black Ridge and Cape Sastrugi (Deep Freeze Range, North Victoria Land), have been mapped as belonging to the complex defined as Amphibolite Facies Metasediments. Contrasting textural and compositional features differentiate the metamorphic basement of Black Ridge and of Cape Sastrugi. At Cape Sastrugi, garnets are spessartine-rich almandines and grow together with cordierite and K-feldspar at the expense of biotite and sillimanite. This textural evidence suggests a single tectono- metamorphic event occurring under high temperature/low pressure conditions, during which the main schistosity developed and the granodioritic leucosomes formed. At Black Ridge, garnets are spessartine-poor almandines; they are anhedral and overgrown with Crd+Bt=Qtz coronas. Textural and compositional data suggest that the growth of cordierite occurred at the expense of garnet, so Black Ridge gneisses should have experienced an earlier metamorphic stage, before the formation of the main schistosity and coronas. A further stage of evolution may be recognized in both localities; it is represented by interfolial sillimanite and biotite and by quartz and muscovite simplectites which represent a retrograde evolution that occurred at constant pressure. (Auth. mod.)

E-45695

Talarico, F., **Reaction textures and metamorphic evolution of aluminous garnet granulites from the Wilson Terrane (Deep Freeze Range, North Victoria Land, Antarctica),** *Società Geologica Italiana, Rome. Memorie,* 1988 Vol.43, Meeting on Earth Science in Antarctica, Siena, Sep. 27-28, 1988. Proceedings, p.49-58, With Italian summary. 13 refs.

Reaction textures and chemographic relationships in aluminous garnet granulites of the Wilson Terrane (Deep Freeze Range, North Victoria Land) are described. The granulites consist of three main types: garnet-cordierite-orthopyroxene (K- feldspar-poor), garnet-orthopyroxene-cordierite (K-feldspar-rich) and garnet-sillimanite-cordierite rocks. They are notable in that they preserve a large number of texturally and mineralogically different reaction rims and symplectitic coronas. The interpretation of reaction textures reveals several successive equilibrium mineral assemblages and a set of sliding and discontinuous reactions. The data are consistent with a polyphase metamorphic history characterized by an early high- pressure granulite facies stage, a more pervasively recorded lower-pressure granulite facies overprinting, and a later amphibolite facies retrograde event. (Auth.)

E-45696

Frezzotti, M.L., Talarico, F., **Preliminary investigations on fluid inclusions in orthopyroxene-garnet-cordierite granulites from Boomerang Glacier (Deep Freeze Range, North Victoria Land, Antarctica): evidence of mixed CO2-CH4 fluids,** *Società Geologica Italiana, Rome. Memorie,* 1988 Vol.43, Meeting on Earth Science in Antarctica, Siena, Sep. 27-28, 1988. Proceedings, p.59-66, With Italian summary. 16 refs.

A preliminary fluid inclusion investigation of quartz grains from orthopyroxene-garnet-cordierite granulites from the Boomerang Glacier, collected during the first Italian Antarctic Expedition, was performed with petrographic, microthermometric and Raman laser techniques. Two populations of fluid inclusions were observed: a first generation with monophase (L) primary and secondary inclusions and a second, much less abundant generation of H2O bearing fluids. Preliminary Raman analyses on gaseous inclusions indicate that they consist of CP2+Ch4 mixtures, with relative proportions around 63 mole% CO2 and 37 mole% CH4 and a molar volume of 43 cu cm/mole. Fluid density and distribution are compatible with a major retrograde event during postmetamorphic uplift of the granulites. However, the origin of high quantities of methane and the exact paleofluid composition remain problematic. (Auth.)

E-45697

Armienti, P., **Palaeozoic and Cainozoic intrusives of Wilson Terrane: geochemical and isotopic data,** *Società Geologica Italiana, Rome. Memorie,* 1988 Vol.43, Meeting on Earth Science in Antarctica, Siena, Sep. 27-28, 1988. Proceedings, p.67-75, With Italian summary. 18 refs.

Two distinct associations of intrusive rocks occur in North Victoria Land between David and Mariner Glaciers; they are respectively of Cambro-Ordovician and Tertiary age. The Palaeozoic intrusives (Granite Harbour Intrusives) are of orogenic nature and, south of Campbell Glacier, they include suites of high-K calc-alkaline to shoshonitic affinity, whose emplacement age is probably not younger than 508 Ma. These magmas were generated at the base of the crust by the interaction of a mantle-melt and a crustal component (40-70% maximum); these magmas evolved successively by fractional crystallization in closed systems, and the most evolved liquids represent 20-30% of the initial dioritic melts. North of Campbell Glacier, Palaeozoic plutons show a variable K-content, an overall peraluminous character, and seem to have been generated through a larger contribution of crustal material. Between Campbell and Mariner Glaciers, Wilson Terrane is intruded by Tertiary anorogenic alkaline intrusives, whose compositions vary from gabbro to alkali granite. They belong to the volcano-plutonic province associated with the Ross Sea rift system. The onset of the alkaline plutonism has to be extended at least to the Eocene- Oligocene transition on the basis of Rb-Sr isotopic data of Mt. McGee intrusion (38 Ma). (Auth.)

E-45698

Caironi, V., **Preliminary results on the characterization of the Granite Harbour Intrusives (Victoria Land, Antarctica) through zircon typology data,** *Società Geologica Italiana, Rome. Memorie,* 1988 Vol.43, Meeting on Earth Science in Antarctica, Siena, Sep. 27-28, 1988. Proceedings, p.77-86, With Italian summary. 16 refs.

Preliminary results of zircon typology studies on samples of Granite Harbour Intrusives are reported. The different characters of the zircon populations lead to the definition of several groups of granitoids belonging to different magmatic series: calcalkaline and aluminous calcalkaline granites derived from water-rich magmas, K-calcalkaline and K-subalkaline granites derived from dry magmas. The results of zircon typology studies are compatible with the model of a subduction-related magmatism on an active continental margin, proposed by other authors on the basis of petrochemical and field data. The distribution in the field of the different types of granitoids suggests a compositional zoning from NE to SW. (Auth.)

E-45699

Capponi, G., **Metamorphic assemblages in layered amphibolites and micaschists from the Dessent Formation (Mountaineer Range, Antarctica),** *Societa Geologica Italiana, Rome. Memorie,* 1988 Vol.43, Meeting on Earth Science in Antarctica, Siena, Sep. 27-28, 1988. Proceedings, p.87-95, With Italian summary. 8 refs.

Layered amphibolite and micaschist sequences of the Dessent Formation record a widespread and pervasive metamorphic overprint in amphibolite facies conditions. Banded amphibolites show an amphibolic mineral assemblage of hornblende+plagioclase+epidote+garnet+quartz. Micaschists exhibit a garnet+biotite+staurolite+plagioclase+quartz assemblage. P-T estimates on amphibole-plagioclase, and garnet- hornblende pairs from amphibolitic rocks, yield P-T values of 650 C +/- 50 C and 6-8 Kb, respectively. These estimates are consistent with the P-T stability fields of metamorphic assemblages characterizing the associated micaschists. (Auth.)

E-45700

Brotzu, P., **Jurassic Ferrar Dolerites and Kirkpatrick Basalts in northern Victoria Land (Antarctica): stratigraphy, geochronology and petrology,** *Societa Geologica Italiana, Rome. Memorie,* 1988 Vol.43, Meeting on Earth Science in Antarctica, Siena, Sep. 27-28, 1988. Proceedings, p.97-116, With Italian summary. Refs. p.115-116.

Stratigraphy, K-Ar dates, major and trace element data and mineral chemistry are presented for magmatic rocks belonging to two sections through the Ferrar rocks of northern Victoria Land. The two sections, which show different petrological characters, have been attributed to the "Ferrar Dolerite" and to the "Kirkpatrick Basalt" on the basis of geological evidence. Samples from both sections yield a 174 +/- 10 Ma isochron age. The studied rocks are basaltic andesite, andesite and dacite. Similarity in mineralogy, continuity in the chemical trends from basaltic andesite to dacite, and results from major and trace element modelling suggest that the rocks are genetically linked by crystal fractionation processes. (Auth.)

E-45701

Martini, M., Giannini, L., **Deception Island (South Shetlands): an area of active volcanism in Antarctica,** *Societa Geologica Italiana, Rome. Memorie,* 1988 Vol.43, Meeting on Earth Science in Antarctica, Siena, Sep. 27-28, 1988. Proceedings, p.117-122, With Italian summary. 16 refs.

The most recent eruptive episodes on Deception I. date back to 1967-70, and low-temperature fumaroles and thermal springs are the present evidence of an active volcanic system. On the basis of the chemical compositions of these manifestations it has been possible to derive a direct influence of an underlying magma body, especially in the northern portion of the island, which thus appears as the most likely location of possible future activity. The phreatomagmatic character of the last eruptions is mainly ascribed to a magma intrusion in shallow and confined water-saturated layers. (Auth.)

E-45702

Baroni, C., **Hells Gate and Backstairs Passage ice shelves, Victoria Land, Antarctica,** *Societa Geologica Italiana, Rome. Memorie,* 1988 Vol.43, Meeting on Earth Science in Antarctica, Siena, Sep. 27-28, 1988. Proceedings, p.123-144, With Italian summary. Refs. p.143-144.

Marine specimens mixed with supraglacial debris occur at the southern margin of the Hells Gate ice shelf (HGIS), which covers an area of about 70 sq km. Shells and debris seem to derive from the grounding line of the ice shelf. They have been incorporated by bottom freezing and then transferred to the ablation surface of the HGIS. Several C-14 dates have been obtained from shells mixed with supraglacial debris. The dates, uncalibrated, range from 1550 +/- 174 (GX-14625) to 2780 +/- 145 (GX-14097) yr B.P. Topographic surveys and C-14 datings were used to obtain preliminary values of some glaciological parameters of the HGIS (ice thickness, velocity, ice growth and ablation rates). The ice thickness of the southern part of the HGIS has been estimated at 63.5 m (eastern margin) and at 34.5 m (western margin). The surface velocity has been estimated at about 3 m/yr at the eastern margin of the HGIS. The ice growth rate has been estimated at 12.2-25 cm/yr at the western side of the ice shelf. A minimum rate of about 5 cm/yr has been recorded at Hells Gate East. The ablation rate has been estimated only at Hells Gate West, where it ranges from 16.5 cm to 36.3 cm/yr considering the ice lost in the last 3 km, on the basis of the difference between the calculated thickness of the HGIS with respect to different velocity values. A very small ice shelf (4-5 sq km) has been recorded in a cove near Backstairs Passage, an historic site of the Heroic Age. The occurrence of dirt cones and fossiliferous sediments on the ice surface of the Backstairs Passage cove implies an ice shelf nourished by bottom freezing, which entrained sediments and shells at its grounding line. Shells samples produced uncal C-14 ages ranging from 1435 +/- 120 (GX-14064) to 2265 +/- 140 (GX-14075) yr B.P. Only a minimum value for the ablation rate can be estimated; it ranges from 2 cm to 2.7 cm/yr, depending on the range of cal AD ages. (Auth. mod.)

E-45703

Orombelli, G., **Holocene environmental changes at Terra Nova Bay (Victoria Land, Antarctica),** *Societa Geologica Italiana, Rome. Memorie,* 1988 Vol.43, Meeting on Earth Science in Antarctica, Siena, Sep. 27-28, 1988. Proceedings, p.145-147, With Italian summary. 5 refs.

The Holocene history of Terra Nova Bay was dominated by the following events: deglaciation of the coastal area and lowering of the outlet glaciers, isostatic uplift and shoreline changes, fluctuations of local glaciers, ice shelves and snow fields, lake level variations and sporadic outburst floods, and return of life on land and in the coastal waters. The deglaciation was accomplished about 7000 yr BP when the first penguin rookeries were already present. Minor glacier and ice shelf advances have occurred since about 5000 yr B.P. A small glacier near Edmonson Point experienced an advance of about 130 m later than 700 yr B.P. In the present century, local glaciers and the Hells Gate ice shelf appear to be retreating while small lakes have slightly increased their levels. (Auth.)

E-45704

Baroni, C., **Strandline Glacier (Victoria Land, Antarctica), variation of the ice-cliff margin 1987-1988,** *Societa Geologica Italiana, Rome. Memorie,* 1988 Vol.43, Meeting on Earth Science in Antarctica, Siena, Sep. 27-28, 1988. Proceedings, p.149-154, With Italian summary. 16 refs.

A detailed geomorphological sketch map has been compiled on the basis of a topographic survey of the Strandline Glacier margin. Measurements made from survey stations during the field seasons 1986/87 and 1987/88 show a recession of the ice cliff of about 0.8 m.

A glacier position measurement made in Dec. 1984 (Ganovex IV) was repeated in Feb. 1988, showing an ice cliff retreat of 2.9 m since that time. (Auth.)

E-45707

Manzoni, M., Miletto, M., **Rock magnetic properties of volcanites from Mt. Melbourne (North Victoria Land): preliminary results,** *Società Geologica Italiana, Rome. Memorie,* 1988 Vol.43, Meeting on Earth Science in Antarctica, Siena, Sep. 27-28, 1988. Proceedings, p.173-180, With Italian summary. 10 refs.

During the 1985/86 Italian Antarctic expedition the Plio-Quaternary volcanics of the McMurdo Group were sampled for rock-magnetic studies at Mt. Melbourne. Intensities of the induced (Ji) and remanent (Jr) magnetizations were investigated in order to contribute to the interpretation of the geomagnetic anomalies. The results show that Jr prevails over Ji and it is, therefore, the main source of the anomalies in this region. Paleomagnetic interpretation is still in progress; nevertheless, two conclusions can be made: the volcanites can be grouped according to the remanence polarity (normal polarities of the Brunhes epoch are the only ones observed in the main volcanic apparatus of Mt. Melbourne; reverse polarities of the Matuyama epoch are confined to peripheral satellite volcanic bodies); and virtual geomagnetic poles (VGP) fall in the proximity of the geographic pole. They are related to the Earth magnetic field drift and are not indicative of tectonic movements. (Auth.)

E-45718

Ogata, H., Mori, H., Takeda, H., **Mineralogy of interstitial rim materials of the Y74123 and Y790981 ureilites and their origin,** *Meteoritics,* Sep. 1991 26(3), p.195-201, 22 refs.

Y74123 is an olivine-rich, relatively unshocked ureilite and contains more interstitial pigeonitic materials than do ureilites which have been reported previously. These materials have been studied by optical microscope, electron microprobe, scanning electron microscope, high resolution transmission electron microscope (TEM) and analytical TEM. Y790981, with shock partial melts, has also been examined by the same techniques. Bulk chemical compositions of the interstitial materials in Y74123 are pyroxene-like and have higher CaO and Al2O3 contents than the large pigeonite and olivine core. Interstitial materials at olivine-pigeonite grain boundaries are richer in CaO and Al2O3 than those at olivine-olivine grain boundaries. TEM observations of the interstitial material of Y74123 show that it consists of alternating pigeonite-augite lamellae more than 3.5 microns thick on (001). This texture suggests that the rim material had already crystallized before the parent body breakup. The shock-produced glassy veins in Y790981 cut through the rim materials. Interstitial materials in this ureilite are a mixture of residual liquids of high Ca melts and shock-produced partial melts of olivine and pigeonite. This mixture accumulated along the grain boundaries and some of it is trapped within grains. (Auth.)

E-45719

Kirkbride, M.P., Bradshaw, M.A., Harmsen, F.J., **Further finds of the Derrick Peak meteorite, Transantarctic Mountains, and implications for terrestrial age,** *Meteoritics,* Sep. 1991 26(3), p.213-216, 27 refs.

Nine additional iron meteorite fragments weighing a total of 72 kg were recovered from the Derrick Peak area by a Canterbury Museum geological party in late 1988. One iron was located in the Onnum Valley, 6 km south of the previous finds. Geochemical analysis indicates that all irons belong to a single meteorite shower, greatly increasing the known extent of the fall zone. The terrestrial age of the meteorite is estimated from glacial geological evidence. The location of the 1988 finds supports the interpretation that the meteorites lie *in situ,* but recent revisions of the chronology of Cenozoic glacial history of the region reduce the interpreted terrestrial age. An age of between Oxygen Isotope stages 6 and 2 is probable (190-125 to 35-12 ka BP). This conflicts with a terrestrial age estimate of 1.0 Ma BP from cosmogenic radionuclides. (Auth.)

E-45724

Stern, R.J., Sultan, M., Abdel Salam, M.G., Dalziel, I.W.D., **Comment and reply on "Pacific margins of Laurentia and East Antarctica-Australia as a conjugate rift pair: evidence and implications for an Eocambrian supercontinent",** *Geology,* Feb. 1992 20(2), p.190-191, 28 refs.

The commentors conclude that the proffered reconstruction is not supported, in that it requires East Africa to face an open ocean at the Cambrian-Precambrian boundary or requires collision between east and west Gondwanaland as late as the Early Paleozoic. The propounder of the theory finds no reason to argue with their conclusion but absorbs it into the basic concept that the Pacific margins of Laurentia and East Antarctica-Australia may have originated as a conjugate pair.

E-45745

Galushkin, IU.I., Dubinin, E.P., Prozorov, IU.I., Ushakov, S.A., **Structure and evolution of continental margins in the southern ocean** [Stroenie i razvitie litosfery perekhodnykh zon IUzhnogo okeana], *Itogi nauki i tekhniki. Seriia fizika Zemli,* 1991 Vol.11, 187p., In Russian with English summary and table of contents. 193 refs.

The relationship between topography, gravity and deep structure of antarctic and South Atlantic continental margins is considered. The continental margins of different age, tectonic history and deep structure of lithosphere are determined. Models of thermal and dynamic evolution of the lithosphere are proposed for several types of continental margins. Morphological, gravity and seismic data were used for modelling the deep structure of the lithosphere. Both sedimentary basin position inside continental margins and variations of relief and gravity in basin evolution are considered. A thermal model of sedimentary evolution is proposed. A method which allows analysis of the time-temperature history of sedimentary layers, and estimates of the maturity of organic matter, is described. It also permits depth intervals for main phases of oil-gas generation to be determined. (Auth.)

E-45754

Birkenmajer, K., Frankiewicz, J.K., Wagner, M., **Tertiary coal from the Lions Cove Formation, King George Island, West Antarctica,** *Polish polar research,* 1991 12(2), p.229-241, With Polish summary. 18 refs.

Thin coal seams found in the Lions Cove Formation, Polonia Glacier Group (Middle Eocene, upper part) at King George Bay, King George I. represent a lustrous (vitrine) brown-coal metaphase. The coal from the lower seam represents carbonized wood, probably angiosperm; that from the upper ones originated due to accumulation of branches or larger wood fragments and leaf remains. These coals are slightly older than metaxylite brown coal previously described from Admiralty Bay on King George I., and dated at the Eocene-Oligocene boundary. Both coal occurrences are evidence of a warm climate which prevailed in the Antarctic Peninsula sector during the Arctowski Interglacial (ca. 50-32 Ma). (Auth.)

E-45756

Birkenmajer, K., Gazdzicki, A., **Polish Antarctic Bibliography: Earth sciences (1960-1990),** *Polish polar research,* 1991 12(2), p.247-260.

The bibliography represents the Polish scientific experience in Antarctica since Jan. 1959 when the first Polish station was established. Since then, two other locations have served as bases for Polish expeditions, the present one being Arctowski Station on Admiralty Bay, King George I. Over the years the major focus has been in earth sciences, but is now expanding to include biology and oceanography. The bibliography comprises about 225 citations, a substantial number being the published research of the compilers but also including the works of many other Polish scientists.

E-45758

Ricci, C.A., ed, Meeting on Earth Science Investigations in Antarctica, Siena, Oct. 4-6, 1989, **Proceedings,** *Società Geologica Italiana, Rome. Memorie,* 1991 Vol.46, 610p., With Italian summaries. Refs. passim. For individual papers see C-45799, E-45766 through E-45798, E-45803, F-45759 through F-45765, L-45800 through L-45802 and L-45804 through L- 45806.

The 3rd meeting on Earth Science Investigations in Antarctica, organized with the sponsorship of the Programma Nazionale di Richerche in Antartide (PNRA), was held in Siena on Oct. 4-6, 1989. This volume contains papers presented at the meeting and a few submitted after the meeting. The 48 papers included cover practically all of the scientific interests of the antarctic earth sciences; most are related to northern Victoria Land and the Ross Sea, but some deal with the Antarctic Peninsula and the Weddell Sea. They are grouped into main themes fairly representative of the sessions of the meeting: paleoclimatic and paleoenvironmental evolution of northern Victoria Land since the Cenozoic; structure and evolution of the Paleozoic margin of Antarctica in northern Victoria Land; tectonics and magmatism in northern Victoria Land and the Ross Sea area since the Late Mesozoic; geothermics and water surface geochemistry; remote sensing; geophysical exploration of northern Victoria Land, and marine geophysics and geology of the Ross Sea.

E-45766

Baroni, C., **Radiocarbon dates from Terra Nova Bay (Victoria Land, Antarctica): conventional and calibrated ages,** *Società Geologica Italiana, Rome. Memorie,* 1991 Vol.46, Meeting on Earth Science Investigations in Antarctica, Siena, Oct. 4-6, 1989. Proceedings, p.81-92, With Italian summary. 18 refs.

A list of 106 C-14 dates obtained from samples collected in the vicinity of Terra Nova Bay during the summers of 1985-1989 is presented. All the samples but one are Holocene in age and consist of penguin guano, penguin bones, seal bones, marine shells and lacustrine algae. The organic samples dated are connected with raised beaches and glacial sediments. They produced numerical dates for the reconstruction of the deglaciation history, relative sea-level variations and Holocene glacier fluctuations. The C-14 dates supplied by organisms that lived or fed in the circumantarctic ocean waters are depleted in C-14 due to the dilution with glacial meltwater and to the upwelling of deep old oceanic water (reservoir effect). In order to correct the conventional C-14 ages, it is necessary to date organisms of known age that died before the nuclear tests. (Auth. mod.)

E-45767

Baroni, C., Stenni, B., Longinelli, A., **Isotopic composition of Holocene shells from raised beaches and ice shelves of Terra Nova Bay (Victoria Land, Antarctica),** *Società Geologica Italiana, Rome. Memorie,* 1991 Vol.46, Meeting on Earth Science Investigations in Antarctica, Siena, Oct. 4-6, 1989. Proceedings, p.93-102, With Italian summary. 15 refs.

Seventy-six samples of calcium carbonate from shells and skeletons of fossil marine organisms collected in the area of Terra Nova Bay have been measured for their C-13/C-12 and O-18/O- 16 ratios. Solitary corals have been measured along with bryozoans, cirripeds, serpulids and pelecypods coming from fossil beaches, supraglacial debris, and dirt cones. Age determinations have been carried out by means of C-14 measurements. The isotopic results obtained may be summarized as follows: the measurements on corals agree well with previous measurements, clearly indicating that these organisms do not precipitate the CaCO3 of their skeleton under isotopic equilibrium conditions with environmental water. The isotopic results obtained from bryozoans do not agree with the data reported in the literature. The specimens show deltaO-18 values not in isotopic equilibrium condition and deltaC-13 values very close to those of normal marine carbonate. Four different species of pelecypods have been studied, their age ranging from recent to about 7000 years B.P. The main interest of these preliminary data is represented by the possibility of detecting relatively small climatic changes even under these extreme conditions and by the possibility of obtaining information on the biological behavior of various marine organisms living in this peculiar environment. (Auth. mod.)

E-45768

Lozej, A., **Radio-echo sounding of Enigma Lake (Northern Foothills, Victoria Land, Antarctica),** *Società Geologica Italiana, Rome. Memorie,* 1991 Vol.46, Meeting on Earth Science Investigations in Antarctica, Siena, Oct. 4-6, 1989. Proceedings, p.103-115, With Italian summary. 20 refs.

Eight radar profiles were carried out on Enigma Lake, a small frozen lake located near the Terra Nova Bay Station. A G.S.S.I. radar with a 120 MHz antenna has been used and the exploration was carried out with a time range of 400 ns. The lake is entirely frozen to the bed and is up to 10 m thick. The lake's size and contour are determined by surrounding glaciers and snowdrifts. The buried bedrock topography is convex, similar to the contiguous glacially eroded hills. Shallow reflections near the central debris-covered area show that the lake is composed of two parts: an ice core covered by a thin and discontinuous veneer of debris, cropping out in the central area, and a superimposed layer of clean ice. Oxygen isotope analyses show that the inner core is Pleistocene fossil glacier ice, while the superimposed layer is Holocene lacustrine ice. (Auth. mod.)

E-45769

Findlay, R.H., Brown, A.V., McClenaghan, M.P., **Confirmation of the correlation between Lower Palaeozoic rocks in western Tasmania and northern Victoria Land, Antarctica, and a revised tectonic interpretation,** *Società Geologica Italiana, Rome. Memorie,* 1991 Vol.46, Meeting on Earth Science Investigations in Antarctica, Siena, Oct. 4-6, 1989. Proceedings, p.117-133, With Italian summary. Refs. p.131-133.

Boninitic volcanic units and ultramafic rocks form the lower part of a complex volcano-sedimentary sequence in the Sorell Peninsula-Elliott Bay region of western Tasmania. The volcanic units of the upper part of the sequence constitute a tholeiitic to calc-alkaline sequence. This volcano-sedimentary complex can be correlated with Middle to mid Late Cambrian units further north in the Tasmanian 'Dundas Trough' and with Middle Cambrian units within the Bowers Supergroup of northern Victoria Land. The volcanic rocks of the two regions constitute part of a Middle Cambrian island arc sequence which collided with the Proterozoic Australo-Antarctic craton in Middle Cambrian times, some 30 Ma before the supposed Ross Orogeny, to which has been attributed the regional folding in the Bowers and Robertson Bay Terranes. The status of the Ross Orogeny in northern Victoria Land is questioned. (Auth.)

E-45770

Lombardo, B., Pertusati, P.C., Ricci, C.A., **Some geological and petrological problems in the Wilson Terrane of Borchgrevink Coast (northern Victoria Land, Antarctica),** *Società Geologica Italiana, Rome. Memorie,* 1991 Vol.46, Meeting on Earth Science Investigations in Antarctica, Siena, Oct. 4-6, 1989. Proceedings, p.135-143, With Italian summary. Refs. p.142-143.

New data on the geology and petrology of Wilson Terrane, mostly acquired along Borchgrevink Coast and in the mountain ranges between David and Mariner Glaciers, are reviewed. The discussion covers the following: the processes responsible for the genesis of the Cambro-Ordovician granitoids and the development of the low-pressure metamorphism which characterize large areas of Wilson Terrane; the metamorphic history of the newly discovered granulite rocks and their meaning in the context of the Ross orogeny; the relationships between low-pressure metamorphics and the intermediate pressure metamorphics cropping out at the suture with Bowers Terrane; and the tectonic relationships between Wilson and Bowers Terrane in the Mountaineer Range. (Auth. mod.)

E-45771

Casnedi, R., Pertusati, P.C., **Geology of the Priestley Formation (northern Victoria Land, Antarctica) and its significance in the context of Early Palaeozoic continental reconstruction,** *Società Geologica Italiana, Rome. Memorie,* 1991 Vol.46, Meeting on Earth Science Investigations in Antarctica, Siena, Oct. 4-6, 1989. Proceedings, p.145-156, With Italian summary. Refs. p.155-156.

The Priestley Formation (Wilson Terrane) is the result of the deposition in a sinking foredeep connected with the Cambro-Ordovician Ross Orogeny at the Pacific border of Gondwanaland. It is affected by a low grade regional metamorphism which was overprinted by thermal metamorphism due to synorogenic granitic intrusions. The foredeep filling was supplied by siliciclastic to calcareous turbidity currents, probably eroded from the East Antarctica craton and its marginal shelf. Surveyed sections in areas affected by lowest metamorphism (Foolsmate Glacier and O'Kane Canyon) allow the interpretation of the stratigraphic record. Hemipelagites of basin plain facies preceded turbidity fans prograding from the NW. These pass up into a platform with anoxic facies covered by cross-bedded sandstones of increasing energy. The Priestley Formation is part of the evolution of a peripheral foreland basin probably connected with the Kanmantoo Basin (Australia). (Auth).

E-45772

Ribecai, C., **Occurrence of the organic-walled microfossils from the Priestley Formation (Wilson Terrane, northern Victoria Land, Antarctica) and the problem of their age: a preliminary report,** *Società Geologica Italiana, Rome. Memorie,* 1991 Vol.46, Meeting on Earth Science Investigations in Antarctica, Siena, Oct. 4-6, 1989. Proceedings, p.157-161, 9 refs.

Metasediments of the Priestley Formation (Wilson Terrane, northern Victoria Land) were studied for palynomorphs. Two samples yielded organic walled microfossils of uncertain taxonomic attribution. A comparison between the observed microfossils and representatives of the Precambrian microflora was made, but problems arose from their poor state of preservation. The example of Handler Ridge (Robertson Bay Terrane), erroneously dated to Precambrian on the basis of palynomorphs and trace fossils, suggests caution in dating the Priestley Formation if based only upon badly preserved organic walled microfossils. (Auth.)

E-45773

Skinner, D.N.B., **Metamorphic basement contact relations in the southern Wilson Terrane, Terra Nova Bay, Antarctica—the Boomerang Thrust,** *Società Geologica Italiana, Rome. Memorie,* 1991 Vol.46, Meeting on Earth Science Investigations in Antarctica, Siena, Oct. 4-6, 1989. Proceedings, p.163-178, With Italian summary. 20 refs.

The contact between the two Precambrian basement units in the southern Wilson Terrane—the metamorphic Snowy Point Gneiss Complex and the metasedimentary Priestley Formation—has not been previously seen. In the 1988/89 GANOVEX V antarctic season, a tectonic contact of the two units was located at 74.4S and 163.9E, on the SW ridge of Mt. Dickason, and traced SE across the upper Boomerang Glacier onto the ridge leading to Mt. Keinath. The contact is interpreted as an overthrust where Snowy Point Gneiss Complex has moved southwestwards over Priestley Formation. The thrust is herein named "The Boomerang Thrust". The thrust zone is remarkable for the apparent low degree of tectonic strain in the bounding rocks, particularly in the Priestley Formation of the lower plate. Decimetric open folds on low angle plunging axes (F4) are common to both the Priestley Formation and Snowy Point Gneiss Complex. The age of the thrust can be constrained by one of the myriad of yellowish cordierite (muscovite)-garnet granite dikes that cut completely through the thrust contact zone. (Auth. mod.)

E-45774

Palmeri, R., **Progressive deformation and low pressure/high temperature metamorphism in the Deep Freeze Range, Wilson Terrane, northern Victoria Land, Antarctica,** *Società Geologica Italiana, Rome. Memorie,* 1991 Vol.46, Meeting on Earth Science Investigations in Antarctica, Siena, Oct. 4-6, 1989. Proceedings, p.179-195, With Italian summary. 23 refs.

A structural and petrological study carried out along the two cross-sections of the Wishbone Ridge (upper Boomerang Gl.) and the Mt. Levick area has provided the following results: along both cross-sections there is evidence of at least two main folding phases (D1 and D2) accompanied by metamorphism; moving from SW to NE, as the style of D2 folding becomes gradually tighter and the S2 foliation more pervasive, the metamorphic grade regularly increases from lower amphibolite facies to upper amphibolite—nearly granulite facies. On the basis of mineralogical associations considered for metapelites in terms of the model system KMFASH, three metamorphic facies can be distinguished. These results indicate the composite internal structure of the Wilson Terrane, which would consist of a monometamorphic metasedimentary unit and of an older high-grade polymetamorphic basement. (Auth. mod.)

E-45775

Castelli, D., **Granulite facies rocks of the Wilson Terrane (northern Victoria Land, Antarctica): Campbell Glacier,** *Società Geologica Italiana, Rome. Memorie,* 1991 Vol.46, Meeting on Earth Science Investigations in Antarctica, Siena, Oct. 4-6, 1989. Proceedings, p.197-203, With Italian summary. 13 refs.

This progress report briefly describes the distribution and field relationships of the granulite facies rocks cropping out along the west side of Campbell Glacier. These consist of Grt-Crd+/-Opx metasedimentary varieties and of enderbites, with minor mafic granulites and marbles. Geothermobarometry on Opx-Grt-Crd assemblages from Mt. Emison and Mills Peak suggests equilibration temperatures between 725 to 875 C at P=4.0 to 5.3 Kbar for most samples, but 800-825 C and 7.0 to 8.7 Kbar for two cordierite-free Grt-Opx assemblages from Mt. Emison. These two groups of values, in conjunction with microtextural observations, suggest the likely existence of two separate metamorphic events under granulite facies conditions. Both geological and petrological data indicate that within the Wilson Terrane the Campbell granulite rocks form a distinct geological unit that closely matches some of the granulite terrains of the East Antarctica craton. (Auth. mod.)

E-45776

Biagini, R., Di Vincenzo, G., Ghezzo, C., **Petrology and geochemistry of peraluminous granitoids from Priestley and Aviator Glacier region, northern Victoria Land, Antarctica,** *Società Geologica Italiana, Rome. Memorie,* 1991 Vol.46, Meeting on Earth Science Investigations in Antarctica, Siena, Oct. 4-6, 1989. Proceedings, p.205-230, With Italian summary. Refs. p.224-226.

Cambro-Ordovician peraluminous granitoids occurring between Priestley and Aviator Glaciers have been investigated from a geological, petrographic and geochemical point of view. On the basis of petrographic and field relationships, synkinematic and postkinematic granites have been recognized. Synkinematic granites (SKG) constitute a complex of semi-conformable dykes and sills up to 100 m thick and occur within gneisses that were affected by a low-pressure, high-temperature amphibolite facies metamorphism. Elemental distributions in SKG are rather scattered, and suggest derivation from distinct melt batches originating from different degrees of partial melting of crustal rocks. Postkinematic granites (PKG) occur as a wide belt of stocks and plutons which divides the larger belt of coeval metaluminous granitoids. The PKG, field, petrographic and chemical data allow one to distinguish two main groups: Tinker Type Granites (TTG) and Archambault Type Granites (ATG). For SKG and TTG, petrographic and geochemical data suggest a pure crustal origin (partial melting of metasedimentary and/or felsic metaigneous rocks) which, especially in SKG, involve a pelitic component. (Auth. mod.)

E-45777

Biagini, R., Di Vincenzo, C., Ghezzo, C., **Mineral chemistry of metaluminous granitoids between the David and Campbell Glaciers, Victoria Land (Antarctica),** *Società Geologica Italiana, Rome. Memorie,* 1991 Vol.46, Meeting on Earth Science Investigations in Antarctica, Siena, Oct. 4-6, 1989. Proceedings, p.231-247, With Italian summary. Refs. p.246-247.

In the Cambro-Ordovician metaluminous granitoids of the Wilson Terrane (GHI), two associations can be distinguished: the first with high-K calcalkaline affinity (South Victoria Land+Deep Freeze Range Intrusives-SVLI+DFRI) and the second, with a shoshonitic affinity (Mt. Abbott Intrusives-MAI). SVLI+DFRI ranges in composition from gabbros to leucogranites; MAI ranges from gabbros to syenogranites. 59 samples, mainly from the intermediate to acid rock-types of the two associations, were studied for mineral chemistry and opaque phase typology. MAI plagioclases show moderate zoning, while plagioclases from SVLI+DFRI are generally complexly zoned, with common relic cores in intermediate rocks. The mafic minerals are represented by biotite, amphibole and clino- +/-orthopyroxene in basic and intermediate rocks. Biotite compositions show a general XFe increase with SiO2 whole-rock content; early-formed amphiboles associated with biotites display comparable XFe and range in composition from Fe-edenitic to Fe-pargasitic in MAI, and from actinolitic-hornblende to Fe-hornblende in SVLI+DFRI. Clinopyroxenes range from augite to Fe-salite; orthopyroxene is hypersthene. Mafic minerals are richer in Fe in MAI than in SVLI+DFRI. Only ilmenite, with low hematite content, is present in MAI; in SVLI+DFRI magnetite alone or magnetite associated with ilmenite occur, or ilmenite alone generally occurs in the more mafic rocks. (Auth. mod.)

E-45778

Rocchi, S., **Zircon typology of Cambro-Ordovician granitoids from northern Victoria Land, Antarctica,** *Società Geologica Italiana, Rome. Memorie,* 1991 Vol.46, Meeting on Earth Science Investigations in Antarctica, Siena, Oct. 4-6, 1989. Proceedings, p.249-255, With Italian summary. 14 refs.

Zircon typology of Cambro-Ordovician granitoids from northern Victoria Land led to the identification of three main intrusive associations. The most extensive one includes plutonic masses exposed south of Priestley Glacier and in the Deep Freeze Range; it shows a calc-alkaline character, sometimes with K enrichment. The association of Mt. Abbott, near Terra Nova Bay, has a shoshonitic affinity. The northernmost association, located between Campbell and Aviator Glaciers, involves highly variable amounts of crustal materials in its origin. (Auth.)

E-45779

Vita, G., Lombardo, B., Giuliani, O., **Ordovician uplift pattern in the Wilson Terrane of the Borchgrevink Coast, Victoria Land (Antarctica): evidence from K/Ar dating of metamorphic biotites,** *Società Geologica Italiana, Rome. Memorie,* 1991 Vol.46, Meeting on Earth Science Investigations in Antarctica, Siena, Oct. 4-6, 1989. Proceedings, p.257-265, With Italian summary. 27 refs.

Nineteen biotites from metamorphic rocks of low- to high-grade, collected in the Wilson Terrane of the Ross Orogen along a traverse between the Reeves and Icebreaker Glaciers during the Italian expeditions of 1985-86, 1986-87 and 1987-88, have been dated by the K/Ar method. The new ages fall in the Early and Middle Ordovician, ranging from 494 to 448 Ma. The ages of metamorphic biotites do not appear to be correlated with metamorphic grade, but rather can be divided into four groups, corresponding to different geographic areas. The oldest cooling age (484 Ma) is recorded close to the southern Victoria Land batholith; the youngest ages (455 Ma on average) are recorded in a central belt corresponding to the Deep Freeze Range and Campbell-Tinker divide. The belt with the youngest ages is flanked on both sides by belts with ages around 465-470 Ma. Such differences in the cooling ages of metamorphic basement are thought to result from differential uplift rates or different times of uplift, but may also result from small degrees of re- opening in the K/Ar isotopic system of micas. (Auth. mod.)

E-45780

Tessensohn, F., **Preliminary geological-structural map of Wilson, Bowers and Robertson Bay Terranes in the area between Aviator and Tucker Glaciers (northern Victoria Land, Antarctica),** *Società Geologica Italiana, Rome. Memorie,* 1991 Vol.46, Meeting on Earth Science Investigations in Antarctica, Siena, Oct. 4-6, 1989. Proceedings, p.267-272, With Italian summary. 17 refs.

Wilson, Bowers and Robertson Bay Terranes represent the basement rocks of northern Victoria Land, where they show quite good exposures of their boundary belts. The medium to high-grade, low pressure Wilson Terrane and low-grade Bowers Terrane are characterized by different lithostratigraphic and metamorphic features, and their junction forms the major "suture" of the area. On the Wilson side it is outlined by the thin belt of Dessent Metamorphics, which is affected by medium temperature and medium-high pressure metamorphism. Bowers and Robertson Bay Terranes show similar lithological and metamorphic features. Their junction is marked by a second order tectonic element: the Millen Schist belt, which is also affected by low-grade metamorphism but shows a more complex structural setting. The structural and metamorphic frame of the three terranes and their junction are related to the Ross Orogeny. (Auth. mod.)

E-45781
Flöttmann, T., Kleinschmidt, G., **Kinematics of major structures of north Victoria and Oates Lands, Antarctica,** *Società Geologica Italiana, Rome. Memorie,* 1991 Vol.46, Meeting on Earth Science Investigations in Antarctica, Siena, Oct. 4-6, 1989. Proceedings, p.273-282, With Italian summary. Refs. p.281-282.

The structural setting of north Victoria Land and Oates Coast is dominated by major Cambro-Ordovician fault zones. Leap Year and Lanterman Faults separate segments of different crustal provenance (Wilson, Bowers and Robertson Bay Terranes). Exiles and Wilson Thrusts are intra Wilson Terrane thrust faults with west and eastward directed sense of transport, respectively. In the north the terrane boundary structures are reverse faults with west-over-east sense of transport. In the south fault dips are shallower and show west-over-east transpressional kinematics. The terrane boundary thrusts are explained as large scale flat and ramp structures, which developed during crustal accretion. The same deformational cycle led to the divergent detachment of the Wilson Terrane along Wilson and Exiles thrust faults. (Auth.)

E-45782
Kleinschmidt, G., Mazzoli, C., Sassi, F.P., **Pressure character of the low-grade metapelites from Robertson Bay Terrane and Bowers Terrane, northern Victoria Land (Antarctica),** *Società Geologica Italiana, Rome. Memorie,* 1991 Vol.46, Meeting on Earth Science Investigations in Antarctica, Siena, Oct. 4-6, 1989. Proceedings, p.283-289, With Italian summary. 20 refs.

The geobarometric method based on the *b* spacing of the white K-micas in metapelites was utilized to determine the pressure character of the metamorphism in Robertson Bay Terrane (RBT) and Bowers Terrane (BT). Analytical results indicate that no significant difference exists between RBT and BT, and that all *b* data (240) are close to an average value of 9.027 (3) Å. The conclusion is that both RBT and BT metamorphisms fall in the range of intermediate-pressure (i.e. Barrovian-type) metamorphisms, and can be related to a thermal metamorphic gradient not higher than approximately 15 C/km. Consequently, plate-tectonic models for northern Victoria Land should take into consideration, as further constraints, the identical metamorphic features of the RBT and BT, and the prevalence of relatively low thermal gradients during the metamorphic climax. This constraint suggests that, in the early Paleozoic, the RBT and the BT both belonged to the same relatively deep crustal level, and were both metamorphosed at a considerable depth underneath a thick tectonic cover. (Auth.)

E-45783
Tessensohn, F., **Lithosphere research in the Ross Sea area, Antarctica: achievements and targets,** *Società Geologica Italiana, Rome. Memorie,* 1991 Vol.46, Meeting on Earth Science Investigations in Antarctica, Siena, Oct. 4-6, 1989. Proceedings, p.291-300, With Italian summary. 26 refs.

The antarctic plate forms a critical part of the global geodynamic system. Understanding of its structure and evolution requires modern data on the antarctic lithosphere. Within the antarctic continent, the Ross Sea area can be regarded as one of the key areas for this kind of research. The present structure of the lithosphere is largely characterized by the existence of a large continental rift, a feature that allows the study of the initial processes of lithospheric thinning associated with continental split and break-up. The evolution of the lithosphere of West Antarctica is marked by the generation of a new continental crust at the active Gondwana margin in a series of compressional events, and by its fragmentation which finally led to the present mosaic of crustal blocks. A proposal for an international coordinated research effort is made. (Auth. mod.)

E-45784
Parada, M.A., Orsini, J.B., **Field and whole-rock geochemical constraints on the origin of the compositional variations of the Half Moon Island plutonic complex, South Shetland Islands,** *Società Geologica Italiana, Rome. Memorie,* 1991 Vol.46, Meeting on Earth Science Investigations in Antarctica, Siena, Oct. 4-6, 1989. Proceedings, p.301-314, With Italian summary. Refs. p.313-314.

Half Moon I. is mainly composed of Albian intrusive rocks, a zoned pluton intruding a sequence of basalts, andesites and volcanic breccia. Diorite is the dominant plutonic lithology followed by leucogabbronorite, gabbro and porphyry microdiorite. Aplitic qz-leucomonzonite dikes, and veins cross-cutting the volcanic sequence, complete the plutonic association. The leucogabbronorites are plagioclase+orthopyroxene cumulates formed at the near roof and marginal zones, and they appear to be spatially associated with the gabbros. The diorites gradually developed from the leucogabbros, and these in turn gradually formed the porphyry microdiorites as chilled margins. The observed compositional variation pattern of the studied intrusive rocks is compatible with that expected from the theoretical and experimental simulation of tholeiite magma fractionation. Early plagioclase crystallization at the walls gave rise to denser liquids that were accumulated at the bottom of the reservoir. Disaggregating crystals from the walls favored the accumulation of plagioclase on top of the chamber. Intensive magnetite crystallization at the intermediate stage allowed the fluid motion reversal in which the dioritic melt flowed up. (Auth. mod.)

E-45785
Müller, P., **Cenozoic peralkaline magmatism at the western margin of the Ross Sea, Antarctica,** *Società Geologica Italiana, Rome. Memorie,* 1991 Vol.46, Meeting on Earth Science Investigations in Antarctica, Siena, Oct. 4-6, 1989. Proceedings, p.315-336, With Italian summary. 29 refs.

Geochemically identical intrusive and effusive peralkaline rock series are described from the western margin of the Cenozoic Ross Sea rift. These series, the Meander Intrusives and Malta Volcanics, occur spatially aligned along the master fault between rift and rift shoulder, and adjacent to the well- known alkali-basaltic Hallett Volcanics. Results of petrographical and geochemical investigations indicate that the felsic peralkaline rock series cannot be regarded as direct differentiates from the alkali basaltic magmas. Strong magnetic anomalies coincide with outcrops of peralkaline intrusive or effusive rocks and seem to indicate the presence of mafic bodies at depth. The felsic peralkaline rocks are regarded as products of contact-anatexis caused by fluids originating in the upper mantle and rising with the parent intrusions into the crust. The magmatic activity started in the Late Oligocene with the intrusion of the peralkaline plutons. This was followed by the largely contemporaneous extrusion of peralkaline Malta and alkali-basaltic Hallett Volcanics. Volcanic activity persists to the present. (Auth.)

E-45786
Hörnig, I., Wörner, G., Zipfel, J., **Lower crustal and mantle xenoliths from the Mt. Melbourne volcanic field, northern Victoria Land, Antarctica,** *Società Geologica Italiana, Rome. Memorie,* 1991 Vol.46, Meeting on Earth Science Investigations in Antarctica, Siena, Oct. 4-6, 1989. Proceedings, p.337-352, With Italian summary. Refs. p.350-352.

Mafic and ultramafic xenoliths from basanitic centers of the Mt. Melbourne volcanic field comprise spinel-peridotites, plagioclase-spinel-peridotites, clino-pyroxenites and gabbro- cumulates. Major and trace elements for bulk rock and mineral phases in mantle peridotites reflect variable modes ranging from fertile cpx- and Ca- and Al-rich compositions to depleted harzburgites and dunites. Secondary enrichment is shown by low Ti pargasites and phlogopite veins. Most strikingly, some fertile peridotites have both plagioclase and spinel in equilibrated textures. Mineralogy and geothermobarometry on peridotite nodules indicate an origin of some of the peridotites under shallow (<8 kb) pressure with a complex cooling-heating history documented in Ca-zoning in olivine. Gabbro-xenoliths of tholeiitic character are clearly distinguished by their undeformed cumulate texture and bulk and mineral compositions. They are derived from a shallow crust/mantle transition zone. (Auth. mod.)

E-45787

Beccaluva, L., **Nature and evolution of the sub-continental lithospheric mantle of Antarctica: evidence from ultramafic xenoliths of the Melbourne volcanic province (northern Victoria Land, Antarctica),** *Società Geologica Italiana, Rome. Memorie,* 1991 Vol.46, Meeting on Earth Science Investigations in Antarctica, Siena, Oct. 4-6, 1989. Proceedings, p.353-370, With Italian summary. Refs. p.368-370.

Ultramafic inclusions are commonly found in the basanite to tephrite lavas of the Melbourne volcanic province. Most nodules are mantle lherzolites, harzburgites and dunites, although olivine websterites are also present. The lherzolites, harzburgites and dunites are characterized by protogranular to porphyroclastic texture with local polygonization, variable grain size (0.1-1 cm) and a typical four phase assemblage consisting of olivine (65-91%), orthopyroxene (6-30%) Cr-diopside (1-12%), and Cr-spinel (0.1-3%). Evidence of metasomatic effects from incompatible element-rich fluids at mantle depth is revealed by the presence of pargasitic amphibole, either as dispersed crystals or in veins, sometimes associated with glassy patches (pyrometamorphic textures). Further evidence can be found in the variable and anomalously high contents of La, Ce, Zr, Nb, Th, Sr, Ba, Rb, K (up to 20 times chondritic) and to a lesser extent Na, observed in many peridotitic xenoliths. Thermobarometric evaluations indicate equilibration conditions in the spinel- peridotite stability field and a minimum provenance depth of about 25 km, just below the Moho discontinuity, which is found in the area at the same depth, according to geophysical data. The inferred geothermal regime of the area fits a "dynamic rift" geotherm where the advective heat is provided by basic magmas invading the upper lithosphere for the last 38 Ma. (Auth. mod.)

E-45788

Lanzafame, G., Villari, L., **Structural evolution and volcanism in northern Victoria Land (Antarctica): data from Mt. Melbourne-Mt. Overlord- Malta Plateau region,** *Società Geologica Italiana, Rome. Memorie,* 1991 Vol.46, Meeting on Earth Science Investigations in Antarctica, Siena, Oct. 4-6, 1989. Proceedings, p.371-381, With Italian summary. 28 refs.

Volcanism has occurred along the western margin of the Ross Sea Basin since the Oligocene, affecting a wide area that extends from the coast of the antarctic continent up to several tens of kilometers inland. Volcanic terrains belonging to the McMurdo Group widely outcrop in the investigated area, which is clearly dissected by two main fault systems cutting through the crystalline basement. During the 1988-89 Italian Antarctic Expedition macro- and mesostructural studies were carried out to recognize the stress field driving the volcanism in the area and to investigate if both the mentioned structural systems were still active. The results of the analyses suggest that normal faults of both systems have been active in very recent times. In particular, some of the recognized structural trends strictly coincide with the eruptive fractures feeding the volcanic activity at Edmonson Point. This structural and volcanic framework suggests a deformation model that usually applies to regions affected by an overall tectonic uplift. Minor reverse faults with largely variable strike locally occur. As they do not appear to be coherent with the general stress field, it is suggested that they reflect local stresses, tentatively attributed to ice movements and/or magma injections. (Auth. mod.)

E-45789

Beccaluva, L., **Basanite to tephrite lavas from Melbourne volcanic province, Victoria Land, Antarctica,** *Società Geologica Italiana, Rome. Memorie,* 1991 Vol.46, Meeting on Earth Science Investigations in Antarctica, Siena, Oct. 4-6, 1989. Proceedings, p.383-395, With Italian summary. Refs. p.393-395.

Basanite to tephrite lavas, which are the object of detailed petrological studies in this paper, scoria cones and hyaloclastites outcrop along the western branch of the Ross Sea Rift System from Cape Washington to Mt. Overlord. They show a crystallization order of the liquidus phases: olivine, Ti-saline, magnetite (basanites) followed by apatite, plagioclase and kaersutite in tephritic rocks. Ultramafic mantle xenoliths together with strongly corroded/reabsorbed kaersutite megacrysts (up to 3 cm in size) are included in the lavas. Compositional variations from basanite to tephrite can be accounted for by fractional crystallization of the basanite mineral assemblage. The compositional similarity between kaersutite could also represent a liquidus phase of tephrite magmas, which could have begun to crystallize at relatively high pressure. On the whole, the genesis of the studied highly alkaline basic melts is compatible with hydrous low-degree partial melting of enriched mantle at high pressure (25-30 Kbar). (Auth. mod.)

E-45790

Armienti, P., **New petrological and geochemical data on Mt. Melbourne volcanic field, northern Victoria Land, Antarctica. (II Italian Antarctic Expedition),** *Società Geologica Italiana, Rome. Memorie,* 1991 Vol.46, Meeting on Earth Science Investigations in Antarctica, Siena, Oct. 4-6, 1989. Proceedings, p.397-424, With Italian summary. 25 refs.

The border of the Ross Sea in northern Victoria Land shows a widespread Cainozoic and Quaternary volcanism related to the Ross Sea Rift System, one of the largest alkaline provinces of the world. Lavas outcropping in the region surrounding the Mt. Melbourne stratocone constitute a Na-alkaline association belonging to the McMurdo Volcanic Group. Volcanic activity spans from Upper Miocene to the present, and was particularly intense during the Pliocene and Quaternary, when a basal sequence dominated by basic stratoid lavas developed before the building of the Melbourne volcano and a series of scattered monogenetic centers. The Melbourne volcano has a summit caldera and is mainly formed by differentiated and often qz-normative volcanic rocks which evolved in a crustal magma chamber. Magmas dominating the ancient fissural activity frequently exhibit a stronger alkaline character than do more recent lavas. The observed phenocryst paragenesis of the basaltic rocks shows strong variations in the Ol/Cpx ratios: those dominated by olivine crystallized at $P<0.15$ GPa, whereas those with clinopyroxene phenocrysts formed at higher pressures. Mugearites and trachytes of Melbourne were derived by an AFC process during which an initial alkali basaltic magma assimilated crustal rocks, in an oxidizing environment; this resulted in increasing Sr isotopic compositions with increasing differentiation. (Auth.)

E-45791

Armienti, P., Tripodo, A., **Petrography and chemistry of lavas and comagmatic xenoliths of Mt. Rittmann, a volcano discovered during the IV Italian expedition in northern Victoria Land (Antarctica),** *Società Geologica Italiana, Rome. Memorie,* 1991 Vol.46, Meeting on Earth Science Investigations in Antarctica, Siena, Oct. 4-6, 1989. Proceedings, p.427-451, With Italian summary. 27 refs.

During the 4th Italian expedition in northern Victoria Land in 1988/89, a new volcano was discovered on the eastern shoulder of Aviator Glacier, north of Mt. Brabec in the Mountaineer Range. It was proposed to assign it the name of Mt. Rittmann. The base of the volcano outcrops on the almost vertical cliffs of the Pilot Glacier and is made up of sequences of thick lava flows interbedded with hyaloclastites. At the top of the volcano there is a summit caldera of about 2 km diameter whose rims are mainly made up of a volcanic breccia containing xenoliths and juvenile pumices. Small remnants of in situ lavas were detected on the top of the volcano and in distal outcrops on the border of Pilot Glacier. Lavas and comagmatic xenoliths range in composition from mildly undersaturated alkali basalts to peralkaline trachytes. Mt. Rittmann products are intermediate in alkalinity and age with respect to Mt. Overlord and Mt. Melbourne, thus suggesting an overall decrease in the alkalinity of parental magmas of Mt. Melbourne volcanic province during the last 7.5 Ma. (Auth. mod.)

E-45792

Bonaccorso, A., **Fumarolic activity at Mt. Rittmann volcano (northern Victoria Land, Antarctica),** *Società Geologica Italiana, Rome. Memorie,* 1991 Vol.46, Meeting on Earth Science Investigations in Antarctica, Siena, Oct. 4-6, 1989. Proceedings, p.453-456, With Italian summary. 2 refs.

Mt. Rittmann is the name proposed for a volcano discovered during the 4th Italian expedition in Antarctica in summer 1988-89. First observations of fumarolic activity along the inner wall of a minor calderic structure, tentatively attributed to Mt. Rittmann volcano, are reported. Temperature measurements yielded values ranging between 57 and 65 C. Gas samples were collected at two of the observed fumaroles. Their composition corresponds to that of the atmosphere, with only minor amounts of CH_4 and CO. (Auth. mod.)

E-45793

Rossi, A., **Preliminary survey of the underground thermal regime in the area around Terra Nova Bay, Victoria Land, Antarctica,** *Società Geologica Italiana, Rome. Memorie,* 1991 Vol.46, Meeting on Earth Science Investigations in Antarctica, Siena, Oct. 4-6, 1989. Proceedings, p.457-461, With Italian summary. 8 refs.

A survey of the geological and geothermal surface characteristics of the Mt. Melbourne volcanic area has led to a preliminary definition of the thermal regime in the area. With the exception of the top part of the Mt. Melbourne volcanic edifice, with fumaroles and exhalative manifestations, the surface thermal characteristics of the area are similar to those of other coastal regions of Antarctica unaffected by volcanic activity or other indicators of a geothermal anomaly. There is, however, probably a deep regional geothermal anomaly related to the recent tectonic evolution of the antarctic continental margin of the western coast of the Ross Sea, and to present-day volcanic activity in Victoria Land. (Auth.)

E-45794

Cremisini, C., Gianelli, G., Mussi, M., Torcini, S., **Geochemistry and isotope chemistry of surface waters and geothermal manifestations at Terra Nova Bay (Victoria Land, Antarctica),** *Società Geologica Italiana, Rome. Memorie,* 1991 Vol.46, Meeting on Earth Science Investigations in Antarctica, Siena, Oct. 4-6, 1989. Proceedings, p.463-475, With Italian summary. 22 refs.

The small lakes in the part of northern Victoria Land explored by the Italian expedition show a wide range of total dissolved solids (0.02-27 g/l). The main water components are of marine origin derived from sea spray, as shown by the ratios between the major cations and anions. The salinity values point instead to a concentration in the dissolved solids due to evaporation and ice sublimation. Evaporation is also confirmed by the stable isotope data: the deltaO-18 and deltaD values spread along an evaporation line with slope of 6.15. The fumaroles at the summit area of Mt. Melbourne are the only geothermal manifestations in the area, and it is very unlikely that geothermal fluids contribute to the surface hydrology. (Auth.)

E-45795

Gragnani, R., Torcini, S., **Geochemistry of trace elements in the surface waters of Terra Nova Bay (Antarctica),** *Società Geologica Italiana, Rome. Memorie,* 1991 Vol.46, Meeting on Earth Science Investigations in Antarctica, Siena, Oct. 4-6, 1989. Proceedings, p.477-493, With Italian summary. 21 refs.

Major, minor and trace element concentrations are reported for 70 samples of meltwaters, streams and lakes taken at 27 different points in Terra Nova Bay. Sodium and chlorine are the dominant ions, followed in order of abundance by magnesium and sulphate, while potassium and calcium concentrations are relatively low. The chemical composition of the analyzed waters is clearly affected by salts of marine origin. Nevertheless, in some cases higher Ca/Cl, Li/Cl and SiO_2/Cl ratios than those found in sea-water indicate leaching and dissolution of rocks. The water-rock interactions are very limited. Generally speaking, trace element levels do not exhibit anomalous values. The highest contents of Ni and Mo are found to be connected with outcrops of metamorphic and granitic formations, respectively. (Auth.)

E-45796

Fortunati, L., **Regional scale structural geology of northern Victoria Land (Antarctica) by satellite image processing,** *Società Geologica Italiana, Rome. Memorie,* 1991 Vol.46, Meeting on Earth Science Investigations in Antarctica, Siena, Oct. 4-6, 1989. Proceedings, p.495-504, With Italian summary. 20 refs.

A new method of terrain survey, based on the analysis of satellite imagery, is tested for geological structural studies over wide continental areas. The climatic and environmental conditions of Antarctica (no vegetation cover) are ideal for using modern remote sensing techniques as a powerful method for geological investigation. The main goal of this paper is the preparation of a thematic geological map obtained by the processing of satellite imagery. A first approach regional geological survey is possible using two main data sets: spectral classes and lineaments. Spectral classes are used to characterize areas with distinctive spectral features and, subsequently, to identify geologically homogeneous blocks of the region. Landsat MSS satellite imagery was used to perform a spectral identification of the "terranes" in northern Victoria Land. The study of the evolution in the field stress in this area is attempted by the interpretation of lineament distribution. (Auth. mod.)

E-45797

Giudice, A., Mazzarini, F., Salvini, F., Storti, F., **Geology of the Mt. Melbourne area, north Victoria Land, Antarctica: evidences from photointerpretative analysis,** *Società Geologica Italiana, Rome. Memorie,* 1991 Vol.46, Meeting on Earth Science Investigations in Antarctica, Siena, Oct. 4-6, 1989. Proceedings, p.505-514, With Italian summary. 25 refs.

A photogeological study through stereopairs acquired by the U.S.G.S. in northern Victoria Land, together with new data obtained by the PNRA Italian expeditions, allowed the preparation of a 1:100,000 geological map of the area included in the Mt. Melbourne quad of the U.S.G.S. antarctic cartography. Six units were recognized within the low-to high-grade metamorphic complex, introducing new subdivisions within two of the three recognized in the literature. In addition to the foliation and folded-style structure developed during the Ross Orogeny, later thrust tectonics of uncertain age (Ordovician?, Silurian?), before the development of regional Cenozoic Subvertical tectonics, were recognized. (Auth.)

E-45798

Salvini, F., **Rock-enhanced thematic mapping of glaciated terranes from satellite imagery in Antarctica,** *Società Geologica Italiana, Rome. Memorie,* 1991 Vol.46, Meeting on Earth Science Investigations in Antarctica, Siena, Oct. 4-6, 1989. Proceedings, p.515-520, With Italian summary. 10 refs.

This study is a first evaluation of satellite imagery of glaciated terranes, testing the geologic validity of satellite information and the feasibility of using such information to produce a thematic map for geological interpretation. The study area is the sector of northern Victoria Land bordered by the Reeves Glaciers southward and the Mountaineer Range northward. Approximately 90% of the surface is covered with ice, and it is assumed that the satellite imagery contains pixels representing pure ice (85%) or cropping out rock (5%), and pixels representing mixed ice and rock (10%). The purpose of the paper presented is to prepare a deicing algorithm to restore rock information in the pixels belonging to the last class (i.e. mixed ice and rock). (Auth. mod.)

E-45803

Bozzo, E., Ghezzi, G., Simeoni, U., Taviani, M., **Magnetic susceptibility of Ross Sea continental shelf surficial sediments (Antarctica),** *Società Geologica Italiana, Rome. Memorie,* 1991 Vol.46, Meeting on Earth Science Investigations in Antarctica, Siena, Oct. 4-6, 1989. Proceedings, p.563-569, With Italian summary. 29 refs.

A survey of the magnetic susceptibility of the Ross Sea shelf surficial sediments between latitude 74 and 76S has shown the validity of this parameter for the study of sediment dispersal patterns. A good relationship between source and accumulation areas is apparent. This is well exemplified by the low susceptibility of nearshore sediments, that are fed by low susceptive lithologies associated with the predominantly granitic rocks of the Granite Harbour Intrusives, outcropping in the adjacent Northern Foothills, and by the high susceptibility of shelfal sediments off Cape Washington related to the high susceptive volcanics of Mt. Melbourne. Intermediate values are widespread and testify to the contribution of susceptibility- differentiated source areas, which also include lithologies from the "Wilson Terrane Metamorphics." (Auth. mod.)

E-45820

Behrendt, J.C., Cooper, A., **Uplift of the shoulder escarpment of the west antarctic rift system and its relation to Late Cenozoic climate change,** *Antarctic journal of the United States,* 1990 25(5), p.1-3, 11 refs.

The amount of uplift of the rift shoulder in the west antarctic rift system was examined in light of extreme elevations. The steep scarp suggests a youthful topography; it is interpreted to be the expression of a major normal or extensional fault that defines the boundary of the Cenozoic west antarctic rift system and the rift shoulder. It is also interpreted that the main cause of uplift, along the west antarctic rift shoulder, is late Cenozoic tectonism associated with rifting, probably as modeled by Stern and ten Brink (1989), for a continental lithospheric plate heated at the free edge. A probable synergistic relation is suggested between episodic tectonism in the Cenozoic west antarctic rift system and the waxing and waning of the antarctic ice sheet approximately coincident in time with rifting, mountain uplift, and volcanism since Oligocene or earlier time.

E-45821

Kimbrough, D.L., Luyendyk, B.P., Richard, S.M., Smith, C., **Geology of metamorphic rocks and granitoids: Ford Ranges of western Marie Byrd Land,** *Antarctic journal of the United States,* 1990 25(5), p.3-5, 8 refs.

A multidisciplinary investigation of crystalline basement rock in the Ford Ranges of Marie Byrd Land was initiated during austral summer 1989-1990. Work was concentrated on the high-grade metamorphic rocks of the Fosdick Mountains and plutonic rocks in the adjacent Chester Mountains. An east-west traverse of the Fosdick Mountains, with a linking north-south traverse to the Chester Mountains was completed, mapping, making detailed structural observations, and collecting rock samples for paleomagnetic, geochronologic, and petrologic studies. Three major geologic domains were recognized in the basement rocks. These are the Fosdick domain, consisting of migmatitic paragneiss, and orthogneiss; the Chester domain, consisting mostly of granodioritic plutons; and the Mount Corey domain, consisting of granite plutons. The contacts between these domains are buried under the intervening glaciers, but observations suggest that a high strain zone separates the Fosdick and Chester domains, and that the Mount Corey granitoids are younger than rocks in either of the other domains.

E-45822

McIntosh, W.C., Panter, K.S., Smellie, J.L., Gamble, J.A., **Austral summer 1989-1990 at the Executive Committee Range, Marie Byrd Land, Antarctica,** *Antarctic journal of the United States,* 1990 25(5), p.5-7, 3 refs.

During the 1989-1990 austral summer, a snowmobile- equipped, six-person WAVE team performed 23 days of field work at the southern end of the Executive Committee Range in central Marie Byrd Land. Detailed geologic mapping and sampling was completed on three volcanoes: Mount Waesche, Mount Sidley, and Mount Cummings. This article reports some of the initial field observations. Mount Waesche (3,292 m) is the southernmost and youngest of the Executive Committee Range volcanoes. Mount Sidley (4,191 m) is Antarctica's highest volcano. It is a symmetrical stratovolcano topped by a 5-km-wide, 1,200-m-deep caldera that is breached on its southern side. A short visit was made to Mount Cumming, a small, poorly exposed volcano from which was collected a representative suite of lava, welded pyroclastic fall, and lherzolitic mantle xenoliths. Field data for Mount Waesche and Mount Sidley have been compiled on enlargements of U.S. Geological Survey 1:250,000 scale maps. Laboratory work in progress includes argon-40/argon-39 dating and petrographic, geochemical and isotopic analysis of lavas and pyroclastic rocks from these volcanoes.

E-45823

Dunbar, N.W., Kyle, P.R., **Volatile contents of melt inclusions in anorthoclase phenocrysts from Mount Erebus: implications for magmatic crystallization,** *Antarctic journal of the United States,* 1990 25(5), p.7-9, 6 refs.

Melt inclusions in Erebus anorthoclase phenocrysts are large and abundant, representing up to 30% of crystal volume. There are two end-member types of melt inclusions, some large (up to 1,000 microns) and irregularly shaped and others smaller (up to 100 microns) and rectangular. The major elements as well as chlorine and sulfur contents of inclusions were analyzed by electron microprobe, and water, fluorine, and a suite of trace elements by ion microprobe. Both of these analytical techniques allow analysis of a 20-micron spot. Major, trace, and volatile element analyses were also made of host feldspar and pyroxene phenocrysts. Results are given in a table. There does not appear to be any significant progression of melt-inclusion composition of phenocrysts from core to rim, nor is there any systematic difference between the composition of large and small melt inclusions. The similarity of major and most trace element compositions between melt inclusions and matrix glass suggests that the melt remained compositionally homogeneous during crystal growth, and the melt inclusions represent true magmatic composition. An anomalous feature of the Mount Erebus magmatic system, however, is that the volatile contents from melt inclusions and degassed matrix glass are virtually identical.

E-45824
Kyle, P.R., **Volatile emissions from Mount Erebus,** *Antarctic journal of the United States,* 1990 25(5), p.9-11, 8 refs.

Mount Erebus, Ross I., is a 3,794-m-high active volcano which contains a permanent active convecting lava lake of anorthoclase phonolite magma. Since Dec. 1983, the sulfur dioxide emission rates from the summit crater of Mount Erebus have been measured to monitor the activity and to give an estimate of the contribution of Erebus to the pristine antarctic environment. To complement these measurements, emission rates of other aerosols and gases were estimated in Dec. 1986. These measurements are discussed and presented in tables. The estimated emission rates for 1983 are extremely high and suggest that Mount Erebus has been an important source of aerosols to the antarctic atmosphere.

E-45825
Vennum, W.R., **Dry valleys mafic dike swarm, southern Victoria Land,** *Antarctic journal of the United States,* 1990 25(5), p.11-14, 16 refs.

The metasedimentary Skeleton Group of Cambrian or Late Proterozoic age is intruded by a suite of locally deformed granitic to dioritic rocks (the Granite Harbor Intrusive Suite) which was emplaced during the Ordovician Ross orogeny. Numerous series of mafic to felsic late synorogenic dikes also of probable Ordovician age cut this basement complex in many parts of southern Victoria Land. The field relations of this dike swarm, henceforth referred to as the dry valleys mafic dike swarm, were examined and samples were collected at five localities (Nussbaum Riegel, Mount Insel, Mount Cerberus, the Eastern shore of Lake Vanda, and on the ridge crest west of the Meserve Glacier in Wright Valley). This article classifies these dikes by describing their mineralogy and petrography, and presents data of a reconnaissance geochemical nature. These results are then compared to similar data derived from calc-alkaline lamprophyres elsewhere in the world. The dry valleys mafic dike swarm does not possess one of the characteristic features of lamprophyres (euhedral mafic phenocrysts) except on a microscopic basis, and are best referred to as "microlamprophyres."

E-45826
Giegengack, R., **Exposure ages and erosion rates for bedrock surface samples from antarctic dry valleys and nunataks,** *Antarctic journal of the United States,* 1990 25(5), p.14-18, 5 refs.

A method of studying geologic processes that occur within the top few meters of the Earth's surface is described. The method is based on the accumulation of radioactive nuclides produced by nuclear-spallation reactions induced by cosmic rays on major elements constituting common minerals. Application of the method to problems of geologic interest is based on the reduction in the production rates of radio-nuclides produced *in situ,* by the overburden of material that has separated the sample in which they are measured from the rock-air interface over the duration of the mean lives of those nuclides. During the summer of 1986-1987, the Polar Studies Institute of Ohio State University undertook a program of systematic sampling of surface rock from localities on the floor and walls of the Wright Valley. Analytical results for 58 samples analyzed are summarized in a table; the locations of samples are plotted. The data show that the areas of Wright Valley from which those samples were collected have been exposed to direct bombardment by secondary cosmic rays for periods of several hundred thousand to about a million years, and that the rates of erosion that have prevailed over those surfaces during that exposure duration have been as low as 0.00001 cm/y.

E-45827
Taylor, T.N., **Triassic osmundaceous ferns from the Allan Hills, southern Victoria Land,** *Antarctic journal of the United States,* 1990 25(5), p.18-19, 6 refs.

During the 1989-1990 summer, extensive collecting was initiated in the Allan Hills to document Permian and Triassic fossil floras and their biostratigraphic location in this region. Some of the most interesting elements of this flora are several ferns, one of which is referable to the Osmundaceae. The Osmundaceae is an ancient family of ferns that can be traced with confidence back to the Upper Permian. Almost all of the fossil evidence for the family consists of permineralized stem segments that display the typical complex stele, fibrous organization of the cortex, and characteristic leaf bases. Living osmundaceous ferns are represented by 3 genera containing approximately 16 species. The frond morphology of the Allan Hills specimens is identical to the extant fern *O. claytoniana,* the interrupted fern, so named because of the presence of reduced sporangial-bearing pinnae midway along the vegetative frond rachis. This article reports the first occurrence of fertile osmundaceous foliage with fertile pinnae attached along the midpoint of the rachis as occurs in living *O. claytoniana.*

E-45828
Taylor, E.L., **Late Triassic flora from the Allan Hills, southern Victoria Land,** *Antarctic journal of the United States,* 1990 25(5), p.20-21, 7 refs.

The occurrence of a well-preserved Late Triassic flora from the Allan Hills, southern Victoria Land, is described. The plants are preserved as impression/compressions in gray, fine- grained siltstones that outcrop along the western side of the eastern arm of the Allan Hills. In some instances, cuticles are present. Collections were made from 3 different horizons during the 1989-1990 summer. The two upper horizons are within Member C of the Lashly Formation, and the third collection comes from siltstone lenses on a sandstone platform within Member B of the Lashly. One of the most common elements of the flora is an osmundaceous fern, in particular specimens that include both vegetative and reproductive parts. Also present are several species of the seed fern *Dicroidium.*

E-45829
Isbell, J.L., **Depositional setting of Permian and Triassic fossil plants in the Allan Hills, southern Victoria Land,** *Antarctic journal of the United States,* 1990 25(5), p.22, 3 refs.

Sedimentology and paleobotany of Permian and Triassic rocks in the Allan Hills were examined during the 1989-1990 summer. Plant fossils were collected from the Permian Weller Coal Measures and Members B and C of the Triassic Lashly Formation. These strata were deposited in a variety of fluvial depositional settings, which included both braided and meandering stream environments. The upper 70 m of the Permian Weller Coal Measures are exposed in the Allan Hills and consist of interstratified sandstone, siltstone, mudstone, and coal. Fine- to medium-grained sandstone dominates in the lower part of the exposed section. Within these sandstones, the presence of large lateral-accretion surfaces suggests that deposition occurred on meandering-stream point bars. *Vertebraria sp.* occurs on the upper portion of some lateral accretion deposits. The location of these *in situ* roots indicates colonization of the upper point bar by glossopterids.

E-45830

Faure, G., Harwood, D.M., **Marine microfossils in till clasts of the Elephant Moraine on the east antarctic ice sheet,** *Antarctic journal of the United States,* 1990 25(5), p.23-25, 20 refs.

The Elephant Moraine is a deposit of clasts and fine- grained sediment on the east antarctic ice sheet about 80 km northwest of Allan Hills, southern Victoria Land. Nodules of clay-rich pebbly sediment occur in bands of sediment-rich ice within the Elephant Moraine. The moraine also contains clasts of a diamicton composed of stones in a gray clay-rich matrix. Sixteen samples (12 nodular till samples, 3 diamictons, and 1 sample of loose sediment from the surface of the ice) were examined for the presence of microfossils. Thirteen of these samples yielded marine diatoms, silicoflagellates, ebridians, radiolarians, sponge spicules, chrysomonad cysts, pollen, and microclasts of diatomaceous marine sediment. The microfossil assemblages included marine diatoms *Actinocyclus actinochilus* and *Thalassiosira lentiginosa* which range from mid-Pliocene to Recent. In addition, a large number of Miocene and possibly older diatoms of marine origin are listed in a table. The presence of marine microfossils in till clasts of the Elephant Moraine strongly supports an east antarctic source for diatoms in the Sirius Group and confirms that deposits of marine sediment of Neogene age exist under the east antarctic ice sheet.

E-45831

Faure, G., Mensing, T.M., Taylor, E.L., **Carbon isotope composition of Permian and Triassic plants in silicified peat, Transantarctic Mountains,** *Antarctic journal of the United States,* 1990 25(5), p.26-27, 15 refs.

The Permian and Triassic rocks of the Beacon Supergroup in the vicinity of the Beardmore Glacier contain deposits of silicified peat. A second deposit of silicified peat occurs on Fremouw Peak, adjacent to the Walcott Névé in rocks of the lower Middle Triassic Fremouw Formation. The macroflora at Fremouw Peak and at Skaar Ridge is preserved as amorphous carbon embedded in chert. Therefore, it should be possible to determine the isotopic composition of carbon not only in bulk samples but also in selected plant organs. To test the feasibility of this idea, the isotopic composition of carbon was measured in the two samples of silicified peat from Fremouw Peak and from Skaar Ridge. The initial results in the table indicate that the Permian and Triassic peat contains "C3" rather than "C4" plants.

E-45832

Isbell, J.L., **Depositional architecture of the Lower Permian Weller Coal Measures, southern Victoria Land,** *Antarctic journal of the United States,* 1990 25(5), p.28-29, 3 refs.

Sedimentologic studies of the Weller Coal Measures were conducted at Beacon Heights, Mount Fleming, and Allan Hills in conjunction with paleobotanical studies during the 1988-1989 and 1989-1990 field seasons. Three environmental facies were identified: lacustrine, meandering stream, and sandy braided stream. The distribution of these facies is shown in a figure. Coal seams are associated with both fluvial settings. The presence of coal shows that humid conditions prevailed during Weller deposition, and suggests that climatic factors were not a major control on changing sedimentation patterns.

E-45833

Borg, S.G., DePaolo, D.J., **Crustal basement provinces of the Transantarctic Mountains, Ross Sea sector,** *Antarctic journal of the United States,* 1990 25(5), p.29-31, 6 refs.

This article summarizes work on the late Precambrian to early Paleozoic basement of the Transantarctic Mountains from June 1, 1989 through June 1, 1990. Combining inferences from the isotopic data with inferences from the authors' fieldwork in the region between the Shackleton and Mulock Glaciers, they speculate about the distribution of lower crustal provinces along a large segment of the Transantarctic Mountains. The arrangement of provinces proposed is shown in a figure. The new isotopic data on the xenoliths provide tangible evidence that the lower crust represented by the Beardmore Glacier Block continues northward at least to southern Victoria Land. Furthermore, the inference of a large right-lateral strike slip fault beneath the Byrd Glacier is strengthened with these data.

E-45834

Wilson, T.J., **Mesozoic and Cenozoic structural patterns in the Transantarctic Mountains, southern Victoria Land,** *Antarctic journal of the United States,* 1990 25(5), p.31-34, 18 refs.

This study focused on mesoscopic fault arrays, which can be used to define regional strain and paleostress patterns where the slip direction on the fault plane is marked by striae and the sense of displacement can be determined. Striated mesoscopic fault planes were found at every locality visited in the study area. The structural results from southern Victoria Land substantially modify the established view of the kinematics of rifting associated with uplift of the Transantarctic Mountains. The principal structural trends in the Transantarctic Mountains and in associated offshore basins of the Ross embayment may have been established during Jurassic rifting. Cenozoic fault patterns, in contrast, indicate extension oblique to the Transantarctic Mountains trend. It is suggested that transtensional reactivation and oblique extension in the Transantarctic Mountains produced pull-apart structures rather than renewed spreading perpendicular to the earlier rift trend.

E-45835

Goodge, J.W., Hansen, V.L., Peacock, S.M., Smith, B.K., **Metamorphic rocks in the Geologists and Miller ranges, Nimrod Glacier area, central Transantarctic Mountains,** *Antarctic journal of the United States,* 1990 25(5), p.35-36, 9 refs.

This article summarizes results of geologic field work conducted in the Nimrod Glacier area of the central Transantarctic Mountains during 1989-1990. The field party established 2 camps in the Geologists Range and Miller Range to study basement metamorphic rocks of the Precambrian Nimrod Group. The principal goal of the project is to improve understanding of the tectonic evolution of these metamorphic rocks with respect to development of the ancient continental margin along the eastern edge of the antarctic craton. The work focused on field relations between lithotectonic units, mega- and mesoscopic structural relations, and collection of samples for quantitative petrologic and thermochronometric analysis. It is found that the ductilely deformed rocks in the Geologists and Miller Ranges constitute a single tectonic zone of considerable structural thickness.

E-45836

Hammer, W.R., ***Thrinaxodon* from Graphite Peak, central Transantarctic Mountains, Antarctica,** *Antarctic journal of the United States,* 1990 25(5), p.37-38, 6 refs.

During the 1985-1986 austral summer, vertebrate specimens were collected from both the late Early to early Middle Triassic upper Fremouw Formation and the Early Scythian (earliest Triassic) lower Fremouw Formation in the Beardmore Glacier region. The primary vertebrate localities in the lower member of the formation in this area were Coalsack Bluff and Graphite Peak. The Graphite Peak material consists mainly of disarticulated to partially articulated specimens of *Lystrosaurus murrayi,* but includes a single right maxilla and mandible of *Thrinaxodon.* Overall the specimen shows no features that would make it a new species of *Thrinaxodon.* It is, however, very fragmentary, and hence it is only questionably referred to *Thrinaxodon liorhinus.*

E-45837

Stump, E., Fitzgerald, P.G., **Field collection for apatite fission track analysis, Ellsworth Mountains,** *Antarctic journal of the United States,* 1990 25(5), p.38-39, 1 ref.

Rock samples for fission track analysis were collected in the Ellsworth Mountains during the 1989-1990 austral summer to provide an understanding of the tectonic history of this crustal block. In broader terms, the study will attempt to relate the uplift history of the Ellsworth Mountains to the tectonic evolution of West Antarctica. Over the span of 4 days, a "vertical" profile was collected of 26 samples from the Vinson Massif covering 2,500 m of relief from the summit (4,897 m) to the head of Nimitz Glacier (1,400 m). The collections obtained provide a composite vertical profile of the Sentinel Range totalling approximately 3,000 m, a transverse profile of the range, and a suite of samples surrounding Nimitz Glacier.

E-45838

Rowell, A.J., Rees, M.N., Evans, K.R., **Depositional setting of the Lower and Middle Cambrian in the Pensacola Mountains,** *Antarctic journal of the United States,* 1990 25(5), p.40-42, 5 refs.

The stratigraphic contrast of the Cambrian sequences in the Neptune and Argentina ranges is one of the enigmas of the Pensacola Mountains, and its explanation is seemingly tectonic. Fieldwork carried out in the 1989-1990 season has shown that there is no evidence for overlap in age of the two carbonate sequences: none of the carbonate platform deposits of the Neptune Range is Early Cambrian, and Middle Cambrian rocks have not been recognized in the Argentina Range. Strike-slip movements may have had a recurring role in complicating the history of the region, but nevertheless strong pre-middle Middle Cambrian deformation clearly had an effect in the Neptune Range and possibly the Argentina Range as it did in the central Transantarctic Mountains. It is suggested that the Neptune Range succession documents Middle Cambrian marine inundation of a new margin, upon which carbonate deposition resumed at least 200 km outboard from the oceanward edge of the Early Cambrian carbonate platform.

E-45839

Askin, R.A., **Preliminary palynology and stratigraphic interpretations from a new Cretaceous-Tertiary boundary section from Seymour Island,** *Antarctic journal of the United States,* 1990 25(5), p.42-44, 13 refs.

Preliminary palynological results for newly collected samples help locate the Cretaceous-Tertiary boundary on Seymour I. A total of 161 samples was collected at 0.1 m intervals from beds with typically Maastrichtian invertebrate fossils through beds rich in glauconite (beginning at 7.6 m) with sparse megafossils. This report concentrates on 26 samples from the 2.5 m glauconitic silty sand interval spanning the proposed boundary. Samples below and above this interval contain, respectively, diagnostic upper Maastrichtian and Danian palynomorph assemblages. Interpreted in sequence-stratigraphy terms, the glauconitic interval spanning the Cretaceous-Tertiary boundary on Seymour I. may represent a condensed section in a transgressive systems tract.

E-45840

Feldman, R.M., **Decapod crustaceans from James Ross Island, Antarctica,** *Antarctic journal of the United States,* 1990 25(5), p.45-46, 13 refs.

This article records the occurrence of several fossil crab and lobster taxa from rocks, ranging in age from Barremian to Campanian, on James Ross I. The discovery of decapod-rich assemblages in pre-late Campanian rocks of western James Ross I. offers a unique opportunity to expand the understanding of the decapod Crustacea.

E-45855

Munksgaard, N.C., Thost, D.E., Hensen, B.J., **Geochemistry of Proterozoic granulites from northern Prince Charles Mountains, East Antarctica,** *Antarctic science,* Mar. 1992 4(1), p.59-69, Refs. p.68-69.

The late Proterozoic basement of the Porthos Range, northern Prince Charles Mountains, is dominated by a suite of felsic to mafic granulites derived from igneous and, less importantly, sedimentary protoliths. Compositionally, they are broadly similar to granulites occurring along the Mac. Robertson Land coast and southern Prince Charles Mountains. Ultramafic to mafic orthopyroxene+clinopyroxene granulites with relict igneous layering occur as lenses within the felsic to mafic granulites, and show compositional evidence of a cumulate origin. The felsic to mafic granulites are intruded by several large charnockite bodies that have similarities to the Mawson Charnockite, and may have formed via a two-stage partial melting process. The charnockite and host granulites are chemically very similar, and both may have been derived from a common middle to lower crustal source region. Undepleted K/Rb ratios suggest retention of original chemistry, with variations being due to fractionation processes. Normalized trace element patterns resembling modern- day arc settings suggest that the Porthos Range granulites were possibly generated in a subduction zone environment. (Auth.)

E-45856

Smillie, R.W., **Suite subdivision and petrological evolution of granitoids from the Taylor Valley and Ferrar Glacier region, south Victoria Land,** *Antarctic science,* Mar. 1992 4(1), p.71-87, Refs. p.85-87.

Detailed geological mapping and geochemical analysis of early Palaeozoic granitoid plutons and dykes from the Taylor Valley and Ferrar Glacier region reveal 2 distinct suites. This suite subdivision-approach is a departure from previous lithology-based schemes and can be applied elsewhere in south Victoria Land. The older calc-alkaline Dry Valleys 1 suite is dominated by the compositionally variable Bonney Pluton, a flow- foliated concordant pluton with an inferred length of over 100 km. The younger alkali-calcic Dry Valleys 2 suite comprises discordant plutons and numerous dyke swarms with complex age relationships. Field characteristics of this suite indicate that it was passively emplaced into fractures at higher levels in the crust than the Dry Valleys 1 suite. Whole-rock geochemistry confirms this suite subdivision, based on field relationships, and indicates that the two suites were derived from different parent magmas by fractional crystallization. The Dry Valleys 1 suite resembles Cordilleran I-type granitoids and is inferred to be derived from partial melting of the upper mantle and/or lower crust above an ancient subduction zone. The Dry Valleys 2 suite resembles Caledonian I-type granitoids and may have resulted from a later episode of crustal extension. (Auth. mod.)

E-45857

Turner, S., Young, G.C., **Thelodont scales from the Middle-Late Devonian Aztec Siltstone, southern Victoria Land, Antarctica,** *Antarctic science,* Mar. 1992 4(1), p.89-105, Refs. p.104-105.

A new fossil agnathan, *Turinia antarctica* sp. nov., based on numerous isolated scales, comes from the lower fish-bearing beds of the Aztec Siltstone. Scales from moraine at Mount Suess, originally described as selachian or psammosteid heterostracan, are referred to the new species which shows close affinity with *T. gondwana* from Bolivia and *T.* cf. *hutkensis* from Iran. Reassessment of the biostratigraphy of Middle Devonian turiniid scales suggests that the lower part of the Aztec Siltstone may be of Eifelian age. (Auth.)

E-45858

Hooker, J.J., **Additional record of a placental mammal (Order Astrapotheria) from the Eocene of West Antarctica,** *Antarctic science,* Mar. 1992 4(1), p.107-108, 10 refs.

Recently, fossil land mammals have been recorded in the James Ross I. area, from the marine middle-late Eocene strata of Seymour I. These include 2 endemic species of polydolopid marsupial: *Antarctodolops dailyi* Woodburne & Zinsmeister 1984, and *Eurydolops seymourensis* Case, Woodburne & Chaney 1988, and 3 partly determinate placentals identified as a tardigrade edentate, a sparnotheriodonitid litoptern and a trigonostylopid astrapothere. The marsupials are represented by fragmentary jaw and complete dental material, the litoptern and astrapothere only by tooth fragments. All are recorded from Unit TELM 5 of the La Meseta Formation, the 2 ungulates at a lower level than the rest. The subject of the present note is a second tooth fragment from Seymour I. identified as an astrapothere. It is worth recording because such mammal remains are rare, and it is from TELM 4, the unit below that yielding the other land mammals.

E-45859

Willan, R.C.R., **Preliminary field observations on peperites and hydrothermal veins and breccias on Livingston Island, South Shetland Islands,** *Antarctic science,* Mar. 1992 4(1), p.109-110, 3 refs.

Sulphide-bearing quartz veins were first observed on Livingston I. in 1958. Subsequent mapping of the host Miers Bluff Formation (MBF) in western Hurd Peninsula either did not record veining or was ambiguous as to its distribution, scale of development and genesis. This note summarizes field mapping which extends the area of the vein/breccia system for an additional 7 km, reinterpreting it as a Cordilleran-epithermal system. Three other settings of mineralization have also been mapped: in peperites in the MBF, in adjacent exposures of the Antarctic Peninsula Volcanic Group and in the Andean Intrusive Suite.

E-45868

Brown, K.L., Webster, J.G., Giggenbach, W.F., Lyon, G.L., **Note on gases dissolved in the deep waters of Lake Vanda,** *New Zealand antarctic record,* 1991 11(1), p.14-18, 9 refs.

A brief study was made in Jan. 1990 of the nature of gases released through the basement of the Wright Valley in Victoria Land and how these affect the chemistry of the deep waters in Lake Vanda. The high levels of He, in particular He-4, and possibly of H2, in the brines at the base of Lake Vanda confirm the diffusion of gases released from the crust beneath the lake into the lake water. The other gases present are likely to have been generated by biogenic activity, particularly the oxidation of organic detritus (CO2) and the reduction of sulphate (H2S). Gases remain dissolved in the deep waters of the lake due to the pressure of the water column (ca. 7bar), preserving the evidence of passive crustal gas emissions from the gneiss/granite rich basement of the Wright Valley.

E-45869

Cook, Y., **Deformation in the St. Johns Range, southern Victoria Land,** *New Zealand antarctic record,* 1991 11(1), p.19-28, 4 refs.

Four main lithologies are found in the deformed basement rocks of the Saint Johns Range. These are the Koettlitz Group, an amphibolite grade sequence of metasediments and metabasites; a mafic pluton; plutonic granitoids and a granitoid orthogneiss, possibly associated with granitoid dykes. The area is poly-deformed, deformation being variably expressed in different lithologies. The Koettlitz Group and orthogneiss have undergone two generations of regional deformation, the first producing a regional north-trending foliation, the second, locally developed structures. Plutonic rocks show evidence of the first generation only, structural variation resulting from their time of intrusion relative to regional deformation and their lithology. Some granitoid dykes are foliated parallel to the regional foliation and some are deformed by second generation structures. A series of later granitoids and the dyke swarm show no tectonic deformation. (Auth.)

E-45870

Waters, A.S., **Basement granitoids of the St. Johns Range, south Victoria Land, Antarctica,** *New Zealand antarctic record,* 1991 11(1), p.29-35, 5 refs.

The basement rocks in the Saint Johns Range consist of a series of granitoid plutonic rocks intruding Koettlitz Group metasediments and intercalated orthogneiss. Five granitoid bodies were identified in the field. Three of these are undeformed and homogeneous and the other two display deformation and/or flow fabrics. Further study will concentrate on the detailed petrography and geochemistry of the granitoid intrusives and a cross-cutting dyke swarm in an attempt to establish possible genetic interrelationships.

E-45873

Ikeda, Y., Nakamura, N., **New type of antarctic carbonaceous chondrite with CI affinities,** *Episodes,* Sep. 1991 14(3), p.252-257, 32 refs.

Three antarctic meteorites, Yamato-82162, Yamato- 86720, and Belgica-7904, are unusual carbonaceous chondrites having characteristics of both CI (Carbonaceous Ivuna-type) and CM (Carbonaceous Mighei-type) chondrite groups, and an international research consortium has carried out studies on these three chondrites. Rare or unique minerals, such as sodian talc, FeO-bearing periclase, an unknown Fe-Ca-S-O mineral, eskolaite, and schreibersite, were found in the chondrites. Phyllosilicate veins formed first in the meteorites, which suggests that hydration took place in the parent body. In spite of the phyllosilicate veins, detailed mineralogy of the altered chondrules and clasts and oxygen isotopic data reveal that most of the phyllosilicates in the chondrules and clasts were produced from anhydrous precursors in the solar nebula. Mineralogical, chemical, and isotopic data indicate that the three chondrites have some characteristics of both CI and CM chondrite groups, and the genetical relationships between the two groups have been brought to light. (Auth. mod.)

E-45874

Black, L.P., Kinny, P.D., Sheraton, J.W., **Difficulties of dating mafic dykes: an antarctic example,** *Contributions to mineralogy and petrology,* 1991 109(2), p.183-194, Refs. p.193-194.

Archaean gneisses of the Vestfold Hills are transected by several compositionally discrete suites of tholeiitic dykes. A representative of one of those suites, which has been dated in the present study, shows that not only Rb-Sr whole-rock isochrons, but also U-Pb zircon techniques (if not properly applied) can produce erroneous crystallization ages. Two zircon populations were recovered from the mafic dyke itself, one of which is 2,483 +/- 9 Ma in age and clearly of xenocrystic origin. The other yields an age of 1,025 +/- 56 Ma, which is not ascribed to the magmatic crystallization of the dyke, but rather to the time that it underwent metamorphic/metasomatic alteration as a response to high-grade tectonism in the adjacent mobile belt. It is presumed that the zircon in question formed by the breakdown of another mineral or minerals (possibly magmatic baddeleyite), due either to ingress of a siliceous fluid, or more probably to the release of silica from the breakdown of pyroxene to amphibole. (Auth. mod.)

E-45878

Fitzsimons, I.C.W., Harley, S.L., **Geological relationships in high-grade gneiss of the Brattstrand Bluffs coastline, Prydz Bay, East Antarctica,** *Australian journal of earth sciences,* Dec. 1991 38(5), p.497-519, Refs. p.518-519.

The Brattstrand Bluffs coastline of Prydz Bay consists of Proterozoic granulite and subordinate late intrusions. Two gneissic associations have been identified, one comprising interlayered felsic and mafic orthogneiss, and the other comprising metapelite-dominated paragneiss. The orthogneiss exhibits fabrics (S1) and migmatitic textures developed in metamorphic events not experienced by the paragneiss. Cover and basement were tectonically interleaved (D2), and then metamorphosed during a Proterozoic granulite event (about 1000 Ma). Geothermobarometry of garnet-orthopyroxene-plagioclase- quartz semi-pelite yields peak pressure-temperature estimates of 0.6 GPa and 850 C for this event. Peak metamorphism was associated with development of a penetrative foliation (S3), and generation and extraction of leucocratic melts from metapelite. Retrograde mineral textures indicate decompression from peak pressures to 0.3-0.4 GPa, which was partly synchronous with localized development of flat-lying folds and shear fabrics (D4). Further retrograde evolution was characterized by cooling, emplacement of a granite pluton and dykes, and D5 shortening to produce a regional antiform under amphibolite to granulite conditions. A pegmatite suite was intruded at about 770 Ma, and mylonite development, further granite intrusion and a greenschist overprint occurred at 500 Ma. (Auth. mod,)

E-45884

Davey, F.J., ed, Logan, H., ed, **Ross Sea sector of Antarctica: workshop on current and future earth science research,** New Zealand Geological Survey Report G151, Lower Hutt, NZ, DSIR Geology and Geophysics, 1991, 66p., For selected papers see C-45885 and L-45886.

This workshop was timed to coincide with the presence in Christchurch of German and Italian expeditions to Antarctica when a good number of U.S. and New Zealand Antarctic researchers were also available. Discussions aimed at formulating questions to be resolved on 6 main topics: glaciology, Cenozoic tectonics, volcanism, granites, the metamorphic basement and geophysics. Good dating was unavailable in several areas, and the relationships of onshore with offshore information and between different terranes were not clear. (Auth.)

E-45891

Benoit, P.H., Sears, D.W.G., **Breakup of a meteorite parent body and the delivery of meteorites to earth,** *Science,* Mar. 27, 1992 255(5052), p.1685-1687, 19 refs.

Whether many of the 10,000 meteorites collected in the Antarctic are unlike those falling elsewhere is contentious. The Antarctic H chondrites, one of the major classes of stony meteorites, include a number of individuals with higher induced thermoluminescence peak temperatures than observed among non- Antarctic H chondrites. The proportion of such individuals decreases with the mean terrestrial age of the meteorites at the various ice fields. These H chondrites have cosmic-ray exposure ages of about 8 million years, experienced little cosmic-ray shielding, and suffered rapid postmetamorphic cooling. Breakup of the H chondrite parent body 8 million years ago may have produced two types of material with different size distributions and thermal histories. The smaller objects reached Earth more rapidly through more rapid orbital evolution. (Auth.)

E-45901

Benoit, P.H., Sears, D.W.G., Sears, H., **Natural thermoluminescence measurements on meteorites collected on the Lewis Cliff blue ice field,** *Antarctic Journal of the United States,* 1990 25(5), p.47-49, 11 refs.

Trends in data from approximately 220 meteorites collected on the Lewis Cliff blue ice field during the 1985-1988 austral summer are reported, and trends noted in a previous report, which were based on a smaller number of measurements, are clarified. Histograms of all the Lewis Cliff ordinary chondrites, separated into upper tongue, lower tongue, and meteorite moraine, are shown in figures. The data seem to indicate distinct differences in the natural thermoluminescence levels of the meteorites from the different sampling localities.

E-45902

Lipschutz, M.E., **Meteorite studies: terrestrial and extraterrestrial applications, 1990 ,** *Antarctic Journal of the United States,* 1990 25(5), p.49-50, 9 refs.

To demonstrate an antarctic/non-antarctic genetic difference in ordinary chondrites, the standard multivariate statistical techniques of discriminant analysis and logistic regression, and a non-standard randomization-simulation method that permits probability assignments on a distribution- free basis, were used. With either method, an antarctic/non-antarctic compositional difference for H4-6 or L4-6 chondrites was established. It is found that the accelerator mass spectrometer is an excellent instrument for tracer and dating studies of rock and ice samples.

E-45903

Orombelli, G., Denton, G.H., **Late Cenozoic glacial history of the Terra Nova Bay region, northern Victoria Land, Antarctica,** *Antarctic Journal of the United States,* 1990 25(5), p.51-52, 7 refs.

In Jan. and Feb. 1989 and 1990 an investigation was carried out to examine past longitudinal profiles of outlet glaciers that drained through the Transantarctic Mountains into Terra Nova Bay. A well defined erosional trimline with distinct upper and lower limits is etched into alpine ridges and spurs on valley walls alongside Reeves, Priestley, and Campbell Glaciers. A figure shows that Reeves Glacier was thicker along its entire length when it stood at the Terra Nova drift limit, with the greatest thickening in coastal regions where grounded ice filled the Terra Nova Bay. Analysis of the illustration leads to the conclusion that the trimline may be metachronous: old near the coast and Late Wisconsin, and even Early Holocene, in the interior.

E-45904

Marchant, D.R., Denton, G.H., Sugden, D.E., **Surficial geology of Sessrumir Valley, western Asgard Range, Antarctica: implications for late Tertiary ice-sheet overriding,** *Antarctic Journal of the United States,* 1990 25(5), p.53-55, 11 refs.

Information based on the surficial stratigraphy and morphologic features of Sessrumir Valley, western Asgard Range, is presented. Two points are clear from the study: the surficial geology of Sessrumir Valley records alternating periods of glaciation and ice-free conditions, with important segments of the record dating to Early Pliocene and perhaps even pre-Pliocene times. No evidence is found of significantly warmer-than-present climates preserved in the stratigraphic record of Sessrumir Valley. The valley shows strong evidence of at least 2 periods of northeastward glacial overriding of the western Asgard Range. An early overriding event is inferred from the Sessrumir till. A younger overriding event is inferred from subglacial channels that are incised in the eastern bedrock spur and Asgard till of Sessrumir Valley.

E-45905

Sugden, D.E., Marchant, D.R., Denton, G.H., **Subglacial meltwater system, Sessrumir Valley, western Asgard Range, Antarctica,** *Antarctic Journal of the United States,* 1990 25(5), p.56-58, 8 refs.

The pattern and morphology of channels and potholes has revealed the existence of subglacial meltwater systems in the Asgard Range. Three points were made clear by the study: the pattern of the channels is consistent with the hypothesis of overriding ice from the southwest; the relationship of the channels to the underlying topography implies that the main features, such as the butte, were present before the overriding glaciation; and wind action accounts for the detailed morphology within the channel system, including fretting, sand dunes, and ripples.

E-45906
Domack, E.W., **Climatic and oceanographic controls upon antarctic fjord sedimentation: examples from the Antarctic Peninsula and South Shetland Islands,** *Antarctic Journal of the United States,* 1990 25(5), p.59-60, 8 refs.

In late Dec., 1987, and Jan., 1988, the R/V *Polar Duke* conducted oceanographic and marine geologic investigations within bays and fjords along the western side of the Antarctic Peninsula and South Shetland Is. These investigations were undertaken to test hypotheses related to climate and glacial marine sedimentation and to establish modern parameters for biogenic and terrigenous facies changes. This article presents a summary of completed studies on modern surface sediments and related facies. Though climate controls the rate and mechanism by which terrigenous sediment is supplied to the glacial marine environment, results presented here demonstrate that the oceanographic and physiographic constraints, which act to influence primary productivity and redistribute the sediment, may be more important to the resulting facies patterns as observed in the study area. Fjords along the Danco Coast and Palmer Archipelago contain both terrigenous and biogenic facies. The facies variations between the subpolar and polar settings so far examined along the Antarctic Peninsula reflect, in part, differences in corresponding climates.

E-45907
Anderson, J.B., Bartek, L.R., **Preliminary results of a high resolution seismic reflection survey of the Ross Sea continental shelf,** *Antarctic Journal of the United States,* 1990 25(5), p.61-63, 6 refs.

Leg 2 of the 1990 R/V *Polar Duke* expedition to the Ross Sea began on Feb. 11 from McMurdo Sound and ended on Mar. 17 at King George I. The scientific objective of the cruise was to acquire high-resolution seismic reflection data on the continental shelf that, in conjunction with existing drill sites on the continental shelf and sites in McMurdo Sound, will provide the basis for developing a high-resolution seismic stratigraphy for the late Paleogene and Neogene strata on the continental shelf. Approximately 6,000 km of seismic data was collected within the Ross Sea, and 800 km of data was acquired in the transit from McMurdo to Palmer Station, including two shelf transects offshore of Marguerite Bay. Gravity and magnetic data acquisition occurred throughout the cruise, resulting in a total of about 8,000 km of data. Data acquisition employed a new seismic source, the generator/injector gun. Only preliminary analysis of the seismic data has been performed to date. The results indicate that grounded ice sheets existed on the Ross Sea continental shelf at least as early as Early Miocene time.

E-45908
Childs, J.R., Cochrane, G.R., Cooper, A.K., Brancolini, G., **Seismic refraction surveys of the Ross Sea,** *Antarctic Journal of the United States,* 1990 25(5), p.64-67, 8 refs.

Seismic refraction/wide-angle reflection experiments using sonobuoys were conducted throughout the Ross Sea by the U.S. Geological Survey in Feb., 1989, and Jan./Feb., 1990 aboard the research vessel *Explora.* In 1989, the multichannel-seismic and sonobuoy program included reconnaissance mapping of the entire Ross Sea, concentrating over the central and southeastern part. The 1990 survey sites lay primarily over the Victoria Land Basin, a 10 to 14 km deep sedimentary basin lying off the western coast of the Ross Sea adjacent to the Transantarctic Mountains. In 1989, 25 sonobuoy stations were collected, of which 23 yielded usable data; in 1990, 31 sonobuoys were deployed, of which 29 were usable. The sonobuoy stations are shown in figures. Details of all sonobuoy stations are summarized in a table. The range to which seismic energy was detected varied from 2 to 29 km, with a mean of 20 km.

E-45909
Bartek, L.R., Raymond, C., **Magnetic and seismic-reflection observations from the western Ross Sea: more evidence of rift-associated tectonic activity in the Victoria Land Basin, Antarctica,** *Antarctic Journal of the United States,* 1990 25(5), p.68-70, 10 refs.

During Leg 2 of the R/V *Polar Duke* expedition to the Ross Sea, seismic, gravity, and magnetic data were collected in the western portion of the Ross. The scientific objective of the cruise was to acquire a high-resolution, seismic-reflection database that will facilitate the development of a high- resolution seismic stratigraphy for the late Paleogene and Neogene strata of the continental shelf. In this article, evidence of rift-associated tectonic activity within the Victoria Land Basin is reported.

E-45910
Klepeis, K.A., **Bathymetry of the Shackleton Fracture Zone, Elephant Island and Clarence Island regions, Antarctica,** *Antarctic Journal of the United States,* 1990 25(5), p.71-73, 3 refs.

During Jan. and Feb., 1990, the U.S. Antarctic Marine Living Resources Program used National Oceanic and Atmospheric Administration's ship *Surveyor* to conduct their second season of biological and oceanographic investigations in the vicinity of the northernmost Antarctic Peninsula, including a study of the Shackleton Fracture Zone and the continental margins surrounding Elephant and Clarence Is. The previously collected bathymetric data had revealed the presence of a deep linear trough, located 20 km to the northeast of the Shackleton Fracture Zone. The trough intersects the margin of Elephant I. where it is paralleled on either side by two linear ridges. The new bathymetric data revealed several important features, including at least one other linear trough that intersects the continental margin north of Elephant I. and that is parallel to the Shackleton Fracture Zone ridge and trough. It is suggested as likely that, as with the linear troughs located closer to the Shackleton Fracture Zone ridge, the newly identified trough is associated with transcurrent motion along the antarctic-scotia plate transform boundary.

E-45911
Wei, W.C., Wise, S.W., Jr., **Correlation of middle Eocene through Oligocene calcareous nanofossil datums with magnetostratigraphy at ODP site 689 on Maud Rise off East Antarctica,** *Antarctic Journal of the United States,* 1990 25(5), p.74-76, 21 refs.

Correlation of the Middle Eocene through Oligocene nanofossil species datums with magnetostratigraphy at ODP site 689 on Maud Rise is summarized in a figure. The figure shows that the relative stratigraphic sequence of many nanofossil datums at this site is the same as that in the mid- and low latitudes, but the positions of most of the datums relative to the magnetic time scale are different from those observed in the mid-latitudes. A brief comparison of the biomagnetostratigraphic correlations at site 689 and those recorded elsewhere is presented.

E-45923
Miller, H., **Revised interpretation of tectonic features in the southern Weddell Sea, Antarctica, from new seismic data,** *Polarforschung,* 1990(Publ. 1991) 60(1), p.33-38, With German summary. 10 refs.

One of the key areas for the reconstruction history of Gondwana is the Weddell Sea. The Alfred Wegener Institute (AWI) carried out two *Polarstern* cruises in 1986/87 and 1989/90 to collect geophysical and bathymetric data in this region. One of the main objectives was to verify the existence and shape of the Explora-Andenes Escarpment, which has been interpreted as an east antarctic plate boundary. The new data give more detailed insights into the structure and evolution of the Explora Escarpment. To the west (19W) the escarpment vanishes as a topographic feature. A newly discovered structure, denominated *Polarstern Bank* (71.5S, 25W, the proposed plate boundary) is interpreted as the result of an uprising of the basement during the Late Cretaceous. It is proposed that the Explora Escarpment and the Andenes Escarpment have different genetic origins. (Auth.)

E-45926

Pospichal, J.J., Wise, S.W., Jr., Asaro, F., Hamilton, N., **Effects of bioturbation across a biostratigraphically complete high southern latitude Cretaceous/Tertiary boundary,** *Geological Society of America. Special paper,* 1990 No.247, p.497-507, 26 refs.

A biostratigraphically complete but intensely bioturbated Cretaceous/Tertiary (K/T) boundary section was taken during drilling at ODP Leg 113 Site 690 on the Maud Rise (65S) in the Weddell Sea off East Antarctica. The boundary, which is contained in a relatively undisturbed core, has been delineated by lithostratigraphic, paleontological, and geochemical methods. The first occurrence of the calcareous nannofossil *Biantholithus sparsus* is used to estimate biostratigraphically the boundary horizon, and a distinct color change between dark brown, clay-rich Tertiary sediments and light-colored Cretaceous chalks is used to more precisely delimit the boundary between 41.5 and 41.8 cm in section 4 of core 15. An iridium peak of 1,566 parts per trillion (ppt) was detected in the same section at 39 to 40 cm. Multiple but less intense Ir peaks were also detected below the boundary. Dark-colored burrows sampled below the boundary contain up to 17% Tertiary nannofossils, estimated to have been displaced at least 1.3 m by large-bodied bioturbators. In addition, the multiple peaks in Ir abundance below the boundary are attributed to the redeposition of Ir by this intense bioturbation. Such processes may account for some multiple Ir peaks reported at other K/T boundary sections. (Auth. mod.)

E-45998

Dunbar, R.B., **Biogenic sediment fluxes in the western Ross Sea,** *Antarctic journal of the United States,* 1990 25(5), p.100-103, 5 refs.

During the 1989-1990 field season, 4 sets of time-series sediment traps were installed on winter-over moorings in the western Ross Sea. Winter-over moorings equipped with current meters and single-cup sediment traps were recovered, and a sediment collection program in Granite Harbor was completed. Sediment cores and grab samples collected in Granite Harbor are listed in a table; results of the chemical analyses are shown in figures. In 2 cores the vertical profiles of alkalinity, ammonium, and phosphate are very similar, a strong indication that early diagenesis of organic matter via sulfate reduction is the dominant control on the concentration of these dissolved components. The alkalinity gradient observed in one of the cores (equivalent to 82 millimolar/m) is one of the highest yet reported in continental shelf sediments.

E-45999

DeMaster, D., **Biogeochemical fluxes in Ross Sea continental shelf sediments,** *Antarctic journal of the United States,* 1990 25(5), p.104-105, 4 refs.

In a 30-day cruise on the *Polar Duke* conducted during Jan. and Feb. 1990, sediment accumulation rates and biogeochemical fluxes in the seabed were measured and suspended particle distributions in the water column were determined. Initial carbon-14 measurements on the organic carbon fraction from a mooring site shown in a figure indicate an accumulation rate of 16 cm/1000 years during the Holocene. The porewater flux data and sediment accumulation rate data from the same site indicate that approximately 45% of the biogenic silica reaching the sediment-water interface dissolves within the seabed. Similar calculations for carbon, nitrogen and phosphorus are planned.

E-46030

Ravindra, R., Pant, N.C., D'Souza, M.J., **Landscape evaluation of Humboldt and adjacent areas, Wohlthat Mountains, East Antarctica,** *Geological Society of India. Journal,* Feb. 1991 37(2), p.172-183, 19 refs.

DLC QE1.G3354

The Humboldt region of the Wohlthat Mountains in East Antarctica depicts both polar and alpine types of morphological set-up. While the former is represented by a vast stretch of antarctic ice sheet with hills and nunataks, the latter is marked by glacially fretted uplands with cirques, aretes, horns and moraines. These and other landforms associated with denudation and depositional processes have been used to evaluate the regional landscape of the Humboldt area, which conforms with the composite erosional landscape of Sugden and John (1976). The glacial geomorphological features are largely due to the Somovken and Humboldt glaciers flowing on either side of the Humboldt flat. The interference of the movement between the two glaciers is reflected in the depositional pattern of moraines. It is suggested that the polar ice covered much greater portions of the area in the past, with ice level covering the ridges at 1900 m-2000 m above sea level. (Auth.)

E-46034

Berkman, P.A., **Holocene meltwater variations recorded in antarctic coastal marine benthic assemblages,** International Conference on the Role of the Polar Regions in Global Change, Fairbanks, June 11-15, 1990. Proceedings, Vol.2, Fairbanks, University of Alaska, Dec. 1991, p.440-449, 57 refs.

Climate changes can influence the input of meltwater from the polar ice sheets. In Antarctica, signatures of meltwater input during the Holocene may be recorded in the benthic fossils which exist at similar altitudes above sea level in emerged beaches around the continent. Interpreting the fossils as meltwater proxy records would be enhanced by understanding the modern ecology of the species in adjacent marine environments. Characteristics of an extant scallop assemblage in West McMurdo Sound have been evaluated across a summer meltwater gradient to provide examples of meltwater records that may be contained in proximal scallop fossils. Integrating environmental proxies from coastal benthic assemblages around Antarctica, over ecological and geological time scales, is a necessary step in evaluating the marginal responses of the ice sheets to climate changes during the Holocene. (Auth.)

E-46038

Elliot, D.H., Bromwich, D.H., Harwood, D.M., Webb, P.N., **Antarctic glacial geologic record and GCM modeling: a test,** International Conference on the Role of the Polar Regions in Global Change, Fairbanks, June 11-15, 1990. Proceedings, Vol.2, Fairbanks, University of Alaska, Dec. 1991, p.508-516, 60 refs.

A recent GCM (General Circulation Model) study of antarctic glaciation by Oglesby concluded that oceanic heat transport is relatively unimportant in the development and maintenance of antarctic glaciation; height and polar position, not the Antarctic Circumpolar Current, have led to thermal isolation; and surface elevation may be crucial for glaciation. Model results are here evaluated against the Pliocene geologic record for Antarctica. The Sirius Group, widely distributed in the Transantarctic Mountains, contains diatom floras suggesting open marine conditions in interior East Antarctica as recently as about 3 m.y.a. If the dating of the Sirius is correct and uplift rates have not been an order of magnitude higher, then polar location and elevation cannot be primary controls on the formation and subsequent fluctuations of the ice sheet. The cause of this discrepancy between modeling results and observations can be sought in limitations to the model (NCAR CCM1) used by Oglesby. Recent work with a coupled atmosphere-ocean GCM indicates that the atmosphere and ocean are strongly linked in high latitudes, and that this interaction is a dominant aspect of climatic variation on (at least) a decadal time scale. Initial results indicate that GCM performance generally needs to be enhanced and, in particular, that realistic interactive atmosphere-ocean models are needed. An improved geologic data base, particularly with respect to age determinations and amounts and rates of uplift, would facilitate model validation. (Auth. mod.)

E-46040

Barker, P.F., Pudsey, C.J., Larter, R.D., **Record of global change in circum-antarctic marine sediments,** International Conference on the Role of the Polar Regions in Global Change, Fairbanks, June 11-15, 1990. Proceedings, Vol.2, Fairbanks, University of Alaska, Dec. 1991, p.586-592, 50 refs.

Prograded sediments of the antarctic continental shelf and slope contain a record of glacial/interglacial changes in ice sheet volume. Modern piston-coring techniques are capable of revealing changes over the last glacial cycle in some detail, in suitably expanded sections. At lower sediment accumulation rates, a less detailed but longer record can be obtained. It can already be shown that, at and around glacial maximum, grounded ice sheets extended to the antarctic continental shelf edge, the marginal sea ice zone lay up to 5 deg farther north, and Weddell Sea Bottom Water flow was far slower than at present. These have implications for the carbon cycle in the oceans, which is of considerable importance in global change. (Auth. mod.)

E-46048

Reagan, M.K., Volpe, A.M., Cashman, K.V., **U-238 and Th-232-series chronology of phonolite fractionation at Mount Erebus, Antarctica,** *Geochimica et cosmochimica acta,* Mar. 1992 56(3), p.1401-1407, 36 refs.

Uranium, thorium, radium, and barium abundances and U-234/U-238 and Th-230/Th-232 isotopic ratios determined by thermal ionization mass spectrometry and (Th-228)/(Th-232) activity ratios determined by alpha spectrometry are used to date anorthoclase growth and infer magma chamber residence times of phonolites erupted in 1984 and 1988 from Mount Erebus. The 1984 and 1988 glasses have slightly different (Th-230)/(Th-232) ratios, but both have a 10% excess of (Th-230) over (U-238) and equilibrium (Th-228) values. By comparing these data and Pb-isotopic data reported in 1975 to similar data for oceanic basalts, the duration of differentiation from basanite to phonolite is limited to less than 150,000 years. The anorthoclase separates have (Th-230)/(U-238) ratios exceeding those of the associated glasses but have (Th-230)/(Th-232) ratios like those of the glasses. Both glasses are depleted in Ra-226 with respect to Th-230 by about 25%, whereas associated anorthoclase separates have extreme excesses of Ra-226 over Th- 230, and (Th-228)/(Th-232)-=2.2. On a plot of (Ra-226)/Ba vs. (Th-230)/Ba, the glass-anorthoclase pairs produce isochrons averaging 2380 y, which represents the average age of anorthoclase growth in the shallow magma system at Erebus. The implied residence time of phonolite magmas in the shallow magma chamber system of Erebus is about 3000 y. Final crystal growth occurred after intrusion into the convecting lava lake less than decades before eruption. (Auth. mod.)

E-46067

Henriet, J.P., **Active margin processes along the Antarctic Peninsula,** *Tectonophysics,* Jan. 30, 1992 201(3/4), p.229-253, Refs. p.252-253.

The Antarctic Peninsula has a remarkable record of active margin processes, which include subduction with progressive ridge-trench collisions, margin segmentation by major fracture zones, rifting in a hybrid back-arc and sheared plate margin context, fore-arc basin development and glacial-marine controlled trench fill processes. Several facets of these active margin processes, both of internal (crustal dynamic) and external origin (climate-controlled), have been documented by a geophysical survey during the Antarktis VI/2 cruise of R.V. *Polarstern* (Oct.-Dec. 1987). The magnetic anomaly pattern of the oceanic slabs facing the northwestern Peninsula margin shows evidence of an intriguing spreading acceleration, which apparently preceded ridge-trench collision. The same anomaly pattern provides a clue to the stratigraphic interpretation of the oceanic sediment cover and of the frontal part of the prograding, now passive margin south of the South Shetland I. Arc. An apparently broken and tilted oceanic plate fragment, squeezed between the South Shetland Trench and Shackleton Fracture Zone, may argue for the role of transpression associated with the oblique convergence of the antarctic and Scotia plates. (Auth. mod.)

E-46068

Bott, M.H.P., Stern, T.A., **Finite element analysis of Transantarctic Mountain uplift and coeval subsidence in the Ross Embayment,** *Tectonophysics,* Jan. 30, 1992 201(3/4), p.341-356, Refs. p.355-356.

The Transantarctic Mountains arguably form the largest continental rift-shoulder structure on earth. Viscoelastic finite element analysis has been used to model the present state of uplift, and of subsidence of the adjacent Victoria Land Basin, as the response to the lithospheric tension and basal upthrust produced by the low density uppermost mantle underlying adjacent West Antarctica and extending for 50-70 km beneath the Transantarctic Mountains. The observed uplift and complementary subsidence across the Transantarctic Fault can be matched by Model TAM4 with a low density upper mantle (-50 kg/cu m) extending 70 km westwards from the fault and from 45 to 200 km depth. The east antarctic lithosphere as modelled has an elastic thickness of 100 km, which decreases to about 25 km at the eastern margin of the craton where the uplift is occurring, and is 25 km thick beneath adjacent West Antarctica. (Auth. mod.)

E-46082

Hong, S.M., **Depositional environment in and paleoglacial setting around Marian Cove, King George Island, Antarctica,** *Korean journal of polar research,* Dec. 1991 2(2), p.73-85, In Korean with English summary. Refs. p.83-85.

Core sediments of Marian Cove are classified into 3 sedimentary facies: waterlain till of the lower part, accumulated just below the grounding line; interlaminated ice-proximal deposits of the middle part, formed by the combination of underwater flow and iceberg dumping; and compound glacial-marine sediments of the upper part, deposited at a sedimentary environment similar to the present. These facies, toward the top, are characterized by the sequence of depositional events formed by a retreating tidewater glacier with decreasing accumulation rate. The combined analysis of core facies and seismic profile suggests that the glaciers around Maxwell Bay and Marian Cove fluctuated with the climatic changes in Antarctica after the Wisconsin glacial period. Grounded glaciers extended to the central basin of Maxwell Bay during Wisconsin glacial period; as grounded glaciers began to retreat about 15,000-14,000 y. a., the central basin of Maxwell Bay became covered by postglacial sediments with an average sedimentation rate of 200- 214 cm/1,000 yr. The glacier of Marian Cove, which retreated at least to the present position in the early Holocene, readvanced with minor climatic cooling in the beginning of the Late Holocene. (Auth. mod.)

E-46083
Kim, Y., Lee, H.W., **Gravity model of geological structure in Barton Peninsula, King George Island,** *Korean journal of polar research,* Dec. 1991 2(2), p.87-100, In Korean with English summary. Refs. p.99-100.

Gravity difference was measured at 66 stations on Barton Peninsula. Two and three dimensional computer models were made based on the Bouguer anomaly which represents density distribution under the surface. Near-surface density was determined as 2.2 g/cu cm by using the Parasnis method. Three other rock types, agglomerate, breccia, and quartz-diorite, exposed in the study area were used for modeling with the average density values of 2.5, 2.6, and 2.7 g/cu cm respectively. The model suggests a NE-SW trending fault at the northwestern margin of the peninsula and the existence of a volcanic vent at the center of the area. The NE-SW profile of the model indicates that magma intrusion may have occurred along the fracture zone which runs parallel to the regional structural trend of the South Shetland Is. This volcanic activity seems to be related to the large scale strike-slip fault movement in the early Cenozoic. (Auth.)

E-46135
Guilizzoni, P., **Limnological studies in Antarctica** [Indagine per una caratterizzazione limnologica di ambienti lacustri antartici], Atti del Primo Convegno di Biologia Antartica, Roma, CNR, 22-23 giugno, 1989 (Meeting on Biology in Antarctica, 1st, Rome, Italy, CNR, June 22-23, 1989. Proceedings). Edited by B. Battaglia, P.M. Bisol and V. Varotto, Padova, Edizioni Universitarie Patavine, 1990, p.377-408, In Italian with English summary. 19 refs.

Materials discussed in this report were collected during the summer season of 1988-89 in 4 areas: Inexpressible I., Tarn Flat, Edmonson Point and the surroundings of Terra Nova Bay Station. Main morphometric parameters as well as the location of about 70 small lakes and pools are reported, 40 of which were sampled for their hydrochemistry. The chemical data of lake waters are discussed in terms of nutrient concentration and salt contents. Due to the presence of thick ice cover of most of the lakes during the season, only a few biological samples (phytoplankton, zooplankton and benthos) were collected. One of the features of the lake water conditions is the low biological activity; in comparison to the benthic algae, the phytoplankton and zooplankton are qualitatively and quantitatively poor. (Auth. mod.)

E-46151
Cosma, B., Frache, R., Mazzuocotelli, A., Soggia, F., **Trace metals in sediments from Terra Nova Bay, Ross Sea, Antarctica,** Antarctica Project. Environmental impact: chemical methodologies, [Rome, Italian Research Council, 1991], p.371-382, Reprinted from Annali di chimica, 1991, Vol.81(7-8 and 9-10). 23 refs.

The concentrations of trace metals (Cu, Pb, Zn, Cd, Cr, Ni, Co and Mn) together with those of some major elements (Fe and Al) in superficial sediments of Terra Nova Bay are reported. The sediments were collected during the Italian Antarctic Expedition of 1987/88 and were subjected to chemical analyses, using 3 different selective methods of solubilization and total attack, and analyzed by inductively coupled plasma (ICP-AES). The average total contents are 25.2 ppm for Cu, 18.3 ppm for Pb, 94.0 ppm for Zn, 106 ppb for Cd, 119 ppm for Cr, 23.4 ppm for Ni, 9.08 ppm for Co, 413 ppm for Mn, 2.3% for Fe and 4.7% for Al. (Auth.)

E-46154
Campanella, L., **Organic matter and metals in lake sediments at Terra Nova Bay (Antarctica),** Antarctica Project. Environmental impact: chemical methodologies, [Rome, Italian Research Council, 1991], p.417-437, Reprinted from Annali di chimica, 1991, Vol.81(7-8 and 9-10). 25 refs.

The problem of metal speciation in lake sediments from Antarctica was investigated, both with selective extraction procedures and with the study of organic matter. Particular attention was devoted to the characterization of humic compounds present in the sediments, since humic and fulvic acids are good complexing agents for metals. Humic substances extracted from the lake sediments were compared with those present in the soil near the lake. (Auth.)

E-46157
Battiston, G.A., Degetto, S., Gerbasi, R., Sbrignadello, G., **Radionuclide content in various samples collected near the Italian base in Antarctica,** Antarctica Project. Environmental impact: chemical methodologies, [Rome, Italian Research Council, 1991], p.469-475, Reprinted from Annali di chimica, 1991, Vol.81(7-8 and 9-10). 4 refs.

Samples of snow, soil, lake sediments and mosses, collected at several stations near the Terra Nova Bay Station, were analyzed for concentrations of natural and man-made radionuclides in order to determine their mobility in that region. The radioactivity data obtained show different values at different locations; tabulated results are discussed.

E-46158
Campanella, L., **Coastal marine sediments from Antarctica: humic and fulvic acids,** Antarctica Project. Environmental impact: chemical methodologies, [Rome, Italian Research Council, 1991], p.477-490, Reprinted from Annali di chimica, 1991, Vol.81(7-8 and 9-10). 27 refs.

Humic and fulvic acids extracted from marine coastal sediments at Terra Nova Bay have been characterized using different techniques, which are described. Results obtained, and shown in tables, are compared with those reported in the literature and the differences found are pointed out. It is concluded that the very low amounts, and often the absence, of fulvic acids in the sediments analyzed indicates that they were completely transformed by condensating reactions to humic acids.

E-46161
Campanella, L., **Structural characteristics of humic substances from antarctic lake sediments,** Antarctica Project. Environmental impact: chemical methodologies, [Rome, Italian Research Council, 1991], p.511-521, Reprinted from Annali di chimica, 1991, Vol.81(7-8 and 9-10). 23 refs.

Humic and fulvic acids from antarctic lake sediments are examined. The IR spectra of humic acids are similar to the ones classified as Type III by Stevenson. All the results (ratio of aliphatic to aromatic carbon, absence of lignin fragments) point to algal origin. (Auth.)

E-46164
Bettoli, M.G., **Distribution of Cs-137 in lake sediments and surrounding soils at Terra Nova Bay, Antarctica,** Antarctica Project. Environmental impact: chemical methodologies, [Rome, Italian Research Council, 1991], p.541-548, Reprinted from Annali di chimica, 1991, Vol.81(7-8 and 9-10). 8 refs.

Radioactivity data (Bq/kg) from sea bottom and lake sediment samples collected in the 1987-88, 1988-89 and 1989-90 Italian expeditions in Antarctica are presented. Vertical distribution of Cs-137 in lake sediment cores and soil pits collected in the 1989-90 expedition are discussed, together with the resulting inventories of the radionuclide; comparisons with literature data concerning both specific activities and inventories are also reported. (Auth.)

E-46172

Tedrow, J.C.F., **Pedogenic linkage between the cold deserts of Antarctica and the polar deserts of the high Arctic,** *American Geophysical Union. Antarctic research series,* 1991 Vol.53, Contributions to antarctic research II, p.1-17, 99 refs.

The cold deserts of Antarctica and the polar deserts of the high Arctic have cryogenic soils with desertlike features. Both sectors have soils with a mineral appearance, desert pavement, small to nonexistent organic components, and low ground temperatures. Both are underlain by permafrost and are subject to cryogenic processes. Whereas virtually all of the soils in Antarctica are well drained, in the high Arctic they are not. Polar desert soils generally have a more acid reaction than cold desert soils. Moisture regimes are quite different in the two sectors. Cold desert soils have a dry condition even down to the frost table. Polar desert soils above the receding frost table are usually quite wet. The humus component in cold desert soils is usually nil, but in the polar desert soils it is commonly as much as 1% to 2% or higher. Whether there are enough distinct differences between the two soils to recognize two different categories remains somewhat moot. After equating all information, however, one appears to be justified in tentatively recognizing two distinct soils. (Auth. mod.)

E-46174

Horner, T.C., Krissek, L.A., **Contributions of sedimentologic, thermal alteration, and organic carbon data to paleoenvironmental interpretation of fine-grained Permian clastics from the Beardmore Glacier region, Antarctica,** *American Geophysical Union. Antarctic research series,* 1991 Vol.53, Contributions to antarctic research II, p.33-65, 35 refs.

Field relations and total organic carbon (TOC) contents have been studied in the finer-grained portions of four Permian formations from the Beardmore Glacier region. Special emphasis has been given to the fine-grained facies because of their potential significance as carriers of paleoclimatic data. In ascending order, the Permian section consists of the Pagoda, Mackellar, Fairchild, and Buckley formations. The Pagoda Formation is composed of sheared gray-green diamictite with minor amounts of sandstone, siltstone and shale, and is interpreted to be a glacial deposit. The Mackellar Formation is composed of interbedded sandstone, siltstone, and shale, and is interpreted to be a shallow deltaic deposit. The Fairchild Formation is dominated by sandstone beds and is interpreted to be a braided stream deposit. The Buckley Formation consists of sandstone with lesser amounts of siltstone, shale, and coal and was formed by braided stream systems and the associated floodplain deposition. The fine-grained intervals of the Pagoda, Mackellar, Fairchild, and Buckley formations have mean TOC contents of 0.20%, 0.33%, 0.98%, and 21.64%, respectively. These large-scale (interformational) differences in the mean TOC content of unaltered samples are interpreted to record an upsection increase in regional productivity, consistent with the general pattern of climatic warming and the decay of the Carboniferous/Permian ice sheet. (Auth. mod.)

E-46175

Behrendt, J.C., **West antarctic rift system: a review of geophysical investigations,** *American Geophysical Union. Antarctic research series,* 1991 Vol.53, Contributions to antarctic research II, p.67-112, 159 refs.

The west antarctic rift system extends over a 3000 x 750 km, largely ice-covered area from the Ross Sea to the Bellingshausen Sea. A spectacular rift-shoulder scarp extends from northern Victoria Land-Queen Maud Mountains to the Ellsworth-Whitmore-Horlick Mountains. The Transantarctic Mountains have been rising since about 60 Ma at episodic rates of the order of 1 km/m.y. most recently since mid-Pliocene time rather than continuously at the mean rate of 100 m/m.y. There is a possible synergistic relation between episodic tectonism in the west antarctic rift system and the waxing and waning of the antarctic ice sheet since Oligocene (or earlier) time. Large offset seismic profiles indicate 17-21 km thickness for the crust in the Ross Sea. A regional positive gravity anomaly throughout the Byrd Subglacial Basin indicates that the crust is approximately 20 km thick, rather than the 30 km reported in earlier interpretations. The west antarctic rift system is due to a continuation of Gondwana breakup that started in the Jurassic, proceeded clockwise around East Antarctica, is still active and may have been so since the late Mesozoic. (Auth. mod.)

E-46177

Arndt, N.T., **U-Pb zircon age and Nd isotopic composition of granitoids, charnockites and supracrustal rocks from Heimefrontfjella, Antarctica,** *Geologische Rundschau,* 1991 80(3), p.759-777, Refs. p.776-777.

Heimefront Range and Mannefallknausane, in Queen Maud Land, comprise an amphibolite-facies terrain and a granulite terrain, separated by a major mylonite zone. The amphibolite terrain is made up of mafic to felsic metavolcanics and metasediments, intruded by granitoid plutons: the granulite terrain has supracrustal rocks with similar lithologies, intruded by felsic plutonic rocks that crystallized as charnockites. U-Pb zircon ages (conventional and ion microprobe) demonstrate that magmatic activity was confined to a relatively short interval between 1130 and 1045 Ma and was followed in the amphibolite terrain by metamorphism around 1060 Ma. Specific ages are given. The youngest age is interpreted as the age of granulite metamorphism, the older ages as those of detrital zircons. A Sm-Nd mineral isochron age of the garnet amphibolite (960 +/- 120 Ma) agrees within error with the U-Pb age of metamorphic zircons (1060 +/- 8 Ma). (Auth. mod.)

E-46186

Antarctic Meteorite Working Group, **Antarctic meteorite newsletter, Vol.15, No.1, Mar. 1992,** Houston, Texas, NASA Johnson Space Center, 1992, 20p.

Classifications of 267 meteorites from the 1986-1990 collections are presented. Descriptions are given for 27 meteorites of special petrologic type. These include 3 achondrites, 4 enstatite chondrites, numerous carbonaceous chondrites, 7 unequilibrated ordinary chondrites, and 4 unusual equilibrated chondrites. The most noteworthy of the whole group is found to be achondrite LEW88663 which has chondritic mineral compositions. (Auth. mod.)

E-46191

Yoshida, Y., ed, NIPR Symposium on Antarctic Geosciences, 11th, Tokyo, Nov. 8-9, 1990, **Proceedings of the NIPR Symposium on Antarctic Geosciences, No.5,** Tokyo, National Institute of Polar Research, 1991, 171p., Refs. passim. For individual papers see E-46198 through E-46206, J-46194, L-46192, L-46193 and L-46195 through L-46197.

This volume consists of 15 full-length papers and 10 abstracts contributed from presentations at the Eleventh Symposium on Antarctic Geosciences. The papers are arranged in the order of solid earth geophysics, geomorphology and geology. Discussed topics in solid earth geophysics deal with seismic activities, mean sea level observation, magnetic anomaly and paleomagnetic studies, volcanic and seismic activities of Mt. Erebus, and new methods for future explosion seismology. Geomorphological studies are related to glacial history of the inland mountains and development of submarine topography. Geological science includes geochemistry of high-grade metamorphic rocks, geochronology of igneous and metamorphic rocks, and cumulate inclusions in late Cenozoic volcanics. (Auth. mod.)

E-46198
Shimizu, H., Kaminuma, K., Dibble, R.R., **Temperature measurements in the crater of Mount Erebus, Ross Island, Antarctica (2),** NIPR Symposium on Antarctic Geosciences, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1991, p.53-60, 6 refs. For Pt.1 of this study see 17E-39056.

Surface temperature distribution in the crater of Mt. Erebus was surveyed during the 1989-1990 field season using an infrared radiation thermometer. A convecting lava lake with a diameter of about 20 to 30 m was observed in the main crater. The maximum surface temperature of the inner crater was 118 C. (Auth.)

E-46199
Tokieda, K., Funaki, M., **Tilting movement of Sör Rondane Mountains and possible apparent polar-wander path for Precambrian to Cambro-Ordovician from Nils Larsenfjellet,** NIPR Symposium on Antarctic Geosciences, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1991, p.61-74, 11 refs.

Alternating field demagnetizations were performed for 479 hand samples (32 sites) collected from the Sör Rondane Mountains. Clear convergence of natural remanent magnetization was observed for only 82 samples (17%) from 8 sites. The virtual geomagnetic pole positions (VGP) from 1550 nunatak dolerite, Brattnipene dolerite and Lunckeryggen syenite fall on a fairly small area. Their radiometric ages are confined to Early Ordovician; the Ordovician VGPs from elsewhere in East Antarctica are significantly deviated from those from the Sör Rondane Mountains. These facts lead to the conclusion that the mass of the Sör Rondane Mountains was undeformed locally, but tilted as a whole relative to the rest of the mass in East Antarctica. A Precambrian VGP, 60.4S, 21.5W in 662 +/- 23 Ma, was estimated from magnetically cleaned remanences and a newly determined Ar-40/Ar-39 age of Mt. Nils Larsen tonalites. An apparent polar-wander path for Precambrian to Cambro-Ordovician from Mt. Nils Larsen is proposed. (Auth. mod.)

E-46200
Ueno, N., Funaki, M., **Preliminary note on paleointensities of the geomagnetic field obtained from rocks in Antarctica,** NIPR Symposium on Antarctic Geosciences, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1991, p.75-83, 16 refs.

Thellier's method was applied to the metamorphic and volcanic rocks of the Napier Complex in Enderby Land, Ongul Is., Mawson Station, Sör Rondane Mountains and McMurdo Sound. The samples treated have partly ambiguous ages, and sometimes show undesirable thermomagnetic properties which cause only a small linear portion in NRM-TRM diagrams and inconsistent paleointensity values for different specimens of the same sample. Results from Enderby Land, Sör Rondane and McMurdo Sound indicate that geomagnetic field strength was 20% higher in the period of 2.5 Ga to 500 Ma, 20% lower 500 Ma ago and 30% higher 1 Ma ago than today. (Auth.)

E-46201
Kagami, H., Kuramochi, H., Shima, Y., **Submarine canyons in the Bellingshausen and Riiser-Larsen Seas around Antarctica,** NIPR Symposium on Antarctic Geosciences, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1991, p.84-98, 19 refs.

Submarine canyons in the Bellingshausen Sea and the Riiser-Larsen area are compared. It is pointed out that the canyons in the Bellingshausen Sea are so located as to build up a deep-sea fan or an apron slope, and that they develop dominantly on an upper fan at the upper continental rise and disappear on a lower fan at the lower continental rise. The canyons in the Riiser-Larsen area have a large-scale entrenching throughout their course and construct a canyon-deep sea channel complex. This is caused by a thermal cooling effect of the lithosphere to deepen the old ocean basin. Buried canyons observed on the seismic profiles indicate that activation of the canyon formation was triggered by advancement of the antarctic ice sheet toward the outer edge of the continental shelf sometime between 4 and 7 Ma BP. The meltwater and eroded sediments from the extended grounded ice sheet provided a potential source for turbidity currents and debris flows into the canyons, thus causing rigorous development of the canyon. (Auth. mod.)

E-46202
Moriwaki, K., Hirakawa, K., Matsuoka, N., **Weathering stage of till and glacial history of the central Sör Rondane Mountains, East Antarctica,** NIPR Symposium on Antarctic Geosciences, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1991, p.99-111, 20 refs.

The Sör Rondane Mountains are in some places covered with tills which show various degrees of weathering. According to the degree of weathering, tills are classified into 5 exposure stages (relative ages). On the basis of height and age data of tills, the glacial history in the central Sör Rondane is constructed as follows: a large part of the mountains was once covered with an ice sheet (prior to 4 Ma); the ice sheet retreated intermittently prior to 1 Ma; in the first half of the last one million years, the ice sheet was stagnant or re-advanced, forming lateral moraines in some places, and the ice sheet surface was about 100 m higher than at present. Since then, the ice sheet has retreated to a level somewhat higher than at present. (Auth. mod.)

E-46203
Tainosho, Y., Takahashi, Y., Osanai, Y., Tsuchiya, N., **Ammonium content of biotites from granitic and metamorphic rocks in the Sör Rondane Mountains, East Antarctica,** NIPR Symposium on Antarctic Geosciences, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1991, p.112-121, 24 refs.

Ammonium content of biotites from granitic and metamorphic rocks in the Sör Rondane Mountains has been determined in order to examine the difference in the NH4+ content of biotites among 6 granite types. Ammonium content of biotites ranges from 12 to 23 ppm (average, 18 ppm) in the migmatitic granite, 23 to 80 ppm in the foliated granite (average, 46 ppm), 22 to 86 ppm (average, 66 ppm) in the massive granite with migmatitic margin, 11 to 66 ppm (average, 42 ppm) in the discordant granite, 28 to 106 ppm (average, 67 ppm) in the granite sheet and dyke, 76 to 109 ppm (average, 92 ppm) in the small granodiorite bodies, and 25 to 142 ppm (average, 52 ppm) in the metamorphic rocks. The high NH4+ content found in biotites from the small granodiorite bodies is probably due to the interaction between the granitic magma and surrounding metamorphic rocks. Biotites from the migmatitic granite have lowest NH4+ content in the granitic rocks analyzed, which disagrees with the field evidence. (Auth. mod.)

E-46204
Takigami, Y., Funaki, M., **Ar-40/Ar-39 and K-Ar ages for igneous and metamorphic rocks from the Sör Rondane Mountains, East Antarctica,** NIPR Symposium on Antarctic Geosciences, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1991, p.122-135, 15 refs.

Eight Ar-40/Ar-39 and six K-Ar ages were determined for igneous and metamorphic rocks collected from the Sör Rondane Mountains. Biotites from granite and syenite show Ar-40/Ar-39 ages of about 500 Ma, which are similar to the reported Rb-Sr age. K-Ar and Ar-40/Ar-39 ages of 440-480 Ma were obtained for igneous dyke samples and metamorphic rocks. Ar-40/Ar-39 age spectra for K-feldspars, which were separated from the same rocks as biotite, indicate stair-type patterns. (Auth.)

E-46205

Santosh, M., Yoshida, M., **Trapped carbon dioxide in east antarctic granulites: evidence from fluid inclusions,** NIPR Symposium on Antarctic Geosciences, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1991, p.136-145, 25 refs.

Charnockites from the Skallen area in the Lützow-Holm Bay region show carbonic fluid inclusions trapped within garnet, feldspar and quartz. Microthermometric and micro-Raman laser analyses characterize these fluids as pure CO2. With a maximum density of 1.05 g/cu cm, these fluids are inferred to represent the traces of the ambient fluid which effected the reduction of water activities and dehydrated large segments of the Gondwanian deep crust. A sympathetic decrease in the densities of carbonic fluids trapped within early to late crystallizing minerals is recorded. This defines an uplift path which crossed higher to lower density isochores, in close correspondence with the T-convex metamorphic P-T trajectory computed for this terrane from mineral phase equilibria constraints. It is suggested that the first direct evidence is provided for the infiltration of CO2 in east antarctic granulites, a well-established mechanism believed to have been instrumental in generating charnockites in the other Gondwana continents. (Auth.)

E-46206

Niida, K., Kaminuma, K., Shibuya, K., **Cumulate inclusions from Turtle Rock, Ross Island, Antarctica,** NIPR Symposium on Antarctic Geosciences, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1991, p.146-157, 23 refs.

Ultramafic to mafic cumulate inclusions in Late Cenozoic basanite at Turtle Rock were used to propose a well-defined compositional variation of the constituent minerals. The Turtle Rock cumulate suite (dunite-wehrlite-clinopyroxenite-gabbro), composed of Fe-rich olivine, clinopyroxene, kaersutitic amphibole, plagioclase and Ti-Fe oxide minerals, has undeformed and unmetasomatized igneous cumulate textures. All the ferromagnesian minerals are Fe-rich (100Mg/(Mg+Fe)=87-60). Clinopyroxenes are dominant in the cumulates and are always Fe-, Ti-, and Al-rich fassaitic augites, of which the compositional range is separated from that of the upper mantle clinopyroxenes. Kaersutitic amphibole, varying continuously from Ti-pargasite to kaersutite, has a chemical composition typical of amphibole found in subcontinental cumulate xenoliths. (Auth.)

E-46304

Barrett, P.J., Hambrey, M.J., **Plio-Pleistocene sedimentation in Ferrar Fiord, Antarctica,** *Sedimentology,* Feb. 1992 39(1), p.109-123, 42 refs.

A 166 m thick Plio-Pleistocene sequence of glacial sediments has been cored in Ferrar Fiord in the southwestern corner of the Ross Sea. The core has the following lithofacies: massive diamictite (33%), weakly stratified diamictite (25%), well-stratified diamictite (8%), sandstone (25%), mudstone (7%), and minor amounts of rhythmite and tuff. The range of facies in this polar setting had a high proportion of aeolian-derived sand and low proportion of mudstone facies. The core can be divided into two sequences based on composition and texture. The sequence from 162 to 100 mbsf (meters below the sea floor) comprises alternations of diamictite dominated by basement lithologies and thin marine mudstone beds. It is Pliocene in age (4.9-2.0 Ma) and records several advances and retreats of ice through the Transantarctic Mountains and across the drill site from the west. The sequence from 100 mbsf to the sea floor, of Pleistocene age, consists of alternations of diamictite, interpreted as lodgement and waterlain till, and sandstone of aeolian origin deposited in a glaciolacustrine setting, similar to ice-covered lakes in the Dry Valleys today. These sediments have a high volcanic component. The Pleistocene sequence above 100 mbsf clearly represents polar glacial sedimentation, with alternations of till and glaciolacustrine sand. Mudstones from the Pliocene sequence beneath include palynomorphs, indicating times when the landscape was at least partially vegetated, but contain no evidence of meltwater influence. (Auth. mod.)

E-46308

Michel-Levy, M.C., Bourot-Denise, M., **Mineral compositions in antarctic and Greenland micrometeorites,** *Meteoritics,* Mar. 1992 27(1), p.73-80, 32 refs.

The mineral compositions of 250 micrometeorites have been studied, and olivines and low-calcium pyroxenes with crystals larger than 5 microns have been analyzed. While magnesium-rich grains dominate, the Fa content of olivine may reach 50% and the Fs content of pyroxene may reach 26%. The Ca and Mn of the olivine show no consistent trends with increasing Fe, but Cr shows a negative correlation. For low-Ca pyroxene, Al and Cr contents are generally higher than in pyroxenes of equilibrated chondrites but similar to those of highly unequilibrated chondrites. Calcium-bearing pyroxene, feldspar and chromite are rare in the micrometeorites which were selected because of their high Mg, Si, Fe and their low Ca and Al content. All these minerals are found as coarse-grained particles often with adhering iron-rich scoria or as clasts in fine-grained or scoriaceous micrometeorites. Apart from a few particles which could be the debris of ordinary chondrites, most micrometeorites probably come from a common source similar, but not identical to carbonaceous chondrites, as shown by their lower Ni and S content and their different oxygen isotopic composition, assuming two measurements performed on olivine grains prove to be typical. (Auth.)

E-46311

Lugmair, G.W., Galer, S.J.G., **Age and isotopic relationships among the angrites Lewis Cliff 86010 and Angra dos Reis,** *Geochimica et cosmochimica acta,* Apr. 1992 56(4), p.1673-1694, 90 refs.

Results of a wide-ranging isotopic investigation of the unique antarctican angrite LEW-86010 (LEW) are presented, together with a reassessment of the type angrite Angra dos Reis (ADOR). The principal objectives of this study are to obtain precise radiometric ages, initial Sr isotopic compositions, and to search for the erstwhile presence of the short-lived nuclei Sm-146 and Al-26 via their daughter products. The isotopic compositions of Sm, U, Ca, and Ti were also measured. This allows a detailed appraisal to be made of the relations between, and the genealogy of, these two angrites. Both the angrite and eucrite parent bodies have extremely low Rb/Sr and high U/Pb ratios compared to the solar nebula. Therefore, the common initial Sr-87/Sr-86 of 0.698970 can be firmly associated with the U-Pb angrite age above, and the formation of both bodies. This enables an absolute chronology of the early solar system to be established. Based upon Sr-87/Sr-86 differences, the oldest CAIs are a minimum of 11 +/- 4 Ma older than the angrites. The age and isotopic constraints are discussed with respect to current collapse, condensation, and accretion timescales calculated for the solar nebula. (Auth. mod.)

E-46334
Tingey, R.J., ed, **Geology of Antarctica,** Oxford monographs on geology and geophysics, No.17, Oxford, Clarendon Press, 1991, 680p., Refs. passim. For individual papers see 46-3756 through 46-3769 or E-46335 through E-46342, E-46345 through E-46353, F-46344 and L-46343.

The 19 chapters of this volume are arranged into 5 parts. The first 9 chapters describe Antarctica's geological and geophysical framework; Ch. 10 and 11 focus on the geological record of Antarctica's Cenozoic and continuing glaciation. Various aspects of antarctic paleontology are reviewed in Ch. 12-16, and Ch. 17 and 18 address the question of Antarctica's resource potential. Recovery of meteorites from the antarctic ice cap is discussed in Ch. 19. A tectonic map of the Scotia Arc region, located in the back pocket of this volume, is included.

E-46335
Tingey, R.J., **Regional geology of Archaean and Proterozoic rocks in Antarctica,** Geology of Antarctica. Edited by R.J. Tingey, Oxford, Clarendon Press, 1991, p.1-73, Refs. p.58-73.

A review, compiled from information published by geologists from most of the nations that have, or have had, antarctic geological research programs, is presented. The following regions are described, from west to east: West Antarctica; the Shackleton Range and Coats Land; western, central and eastern Queen Maud Land; Enderby and Kemp Lands; Mac. Robertson Land; Princess Elizabeth Land; Vestfold Hills; the Shackleton Ice Shelf—Bunger Hills region; Wilkes Land; Adélie Coast and King George V Land; and the Transantarctic Mountains. A discussion of the Precambrian geology of Antarctica concludes this chapter.

E-46336
Laird, M.G., **Late Proterozoic-Middle Palaeozoic rocks of Antarctica,** Geology of Antarctica. Edited by R.J. Tingey, Oxford, Clarendon Press, 1991, p.74-119, Refs. p.110-119.

Most of the known uppermost Proterozoic and Lower Paleozoic rocks of Antarctica outcrop in, or adjacent to, the Transantarctic Mountains. They are exposed in major Late Proterozoic and Early Paleozoic fold belts which border the Precambrian metamorphic shield of East Antarctica. The only known fossiliferous Early Paleozoic rocks younger than Late Cambrian are olistoliths from one locality in northern Victoria Land. However, unfossiliferous formations overlying dated Cambrian sequences in the Ellsworth and Pensacola Mountains and in the Nimrod Glacier region are of Ordovician-Silurian age, and a latest Cambrian or Ordovician age is also likely for the Leap Year Group of northern Victoria Land.

E-46337
Barrett, P.J., **Devonian to Jurassic Beacon Supergroup of the Transantarctic Mountains and correlatives in other parts of Antarctica,** Geology of Antarctica. Edited by R.J. Tingey, Oxford, Clarendon Press, 1991, p.120-152, Refs. p.147-152.

This review outlines the history of Beacon investigations, current lithological and time correlations within the Beacon, and the paleogeographic history of Antarctica during Beacon times from 400 to 180 m.y.a. The chapter ends with a discussion on the geography of the antarctic region during Beacon times; its tectonic setting as suggested by petrographic data from the Beacon strata; and the value of the Beacon Supergroup as a record of climatic history over a period of 200 million years, during which the antarctic continent lay almost entirely in its present polar position.

E-46338
Tingey, R.J., **Mesozoic tholeiitic igneous rocks in Antarctica: the Ferrar (Super) Group and related rocks,** Geology of Antarctica. Edited by R.J. Tingey, Oxford, Clarendon Press, 1991, p.153-174, Refs. p.170-174.

This chapter is essentially a literature review of the Mesozoic tholeiite distribution and exploration, covering volcanic rocks, mafic intrusive rocks, and petrogenesis and tectonics. In the concluding comments, it is pointed out that the antarctic Jurassic tholeiites are subdivided on a geochemical basis into a Transantarctic Mountains sub-province showing similarities with the Tasmanian dolerites, and a Weddell Sea sub-province showing similarities with the Karoo tholeiites in South Africa. The geochemical composition of the Transantarctic tholeiites—the Ferrar Group—opens the question of crustal contamination and derivation from an anomalous mantle source in the genesis of mafic magmas. The Weddell Sea tholeiites are found to have a more normal composition and petrogenesis.

E-46339
Ford, A.B., Himmelberg, G.R., **Geology and crystallization of the Dufek intrusion,** Geology of Antarctica. Edited by R.J. Tingey, Oxford, Clarendon Press, 1991, p.175-214, Refs. p.210-214.

The Dufek intrusion is a stratified body of chiefly gabbroic cumulates with minor interlayers of anorthosite, pyroxenite, and magnetite, and a layer of granophyre capping the cumulate sequence. Present studies show that the rocks form a differentiation sequence comparable in many aspects of mineralogy and petrology to sequences in thoroughly studied layered intrusions. In addressing the question of resources, it is pointed out that many factors hinder a realistic estimation of the Dufek resource potential, a chief one of which is its general concealment by ice; present studies have not yielded indications of platinum-group elements or any other metal concentrations of economic significance in the Dufek intrusion.

E-46340
Barker, P.F., Dalziel, I.W.D., Storey, B.C., **Tectonic development of the Scotia arc region,** Geology of Antarctica. Edited by R.J. Tingey, Oxford, Clarendon Press, 1991, p.215-248, Refs. p.244-248.

In discussing the Scotia Sea basin, it is noted that the Scotia Ridge is composed at least partly of fragments of an original continental connection between South America and the Antarctic Peninsula. All these aspects of regional tectonic evolution, starting with Gondwanaland reconstruction and the development after break-up of the intra-Gondwanaland ocean, are described in the first section of this account. In the next section, the evolution of the Pacific margin is considered, linking the onshore geology to the subduction history where known. Finally, the evidence bearing on Scotia Sea evolution is described and, starting at the present day, a series of reconstructions are given which become increasingly speculative back in time.

E-46341
LeMasurier, W.E., Rex, D.C., **Marie Byrd Land volcanic province and its relation to the Cainozoic west antarctic rift system,** Geology of Antarctica. Edited by R.J. Tingey, Oxford, Clarendon Press, 1991, p.249-284, Refs. p.281-284.

The Marie Byrd Land province provides various examples of interrelationships between rift tectonics and volcanism. This chapter focuses mainly on province-wide field, petrological and chronological relationships, the nature of the rift environment, and the relationships between tectonics and volcanism. A database of K-Ar ages supports interpretations of glacial history, rates of vertical tectonic displacement, and the chronologic development of the province. The discussion relates primarily to major element chemistry; a supplementary table, diagrams, and brief comments about trace element characteristics are provided. Isotopic data provide basic constraints on the nature of the source region and allow inferences to be made by analogy with other rift systems.

E-46342
Anderson, J.B., **Antarctic continental shelf: results from marine geological and geophysical investigations,** Geology of Antarctica. Edited by R.J. Tingey, Oxford, Clarendon Press, 1991, p.285-334, Refs. p.326-334.

This chapter summarizes some of the important findings of research on the antarctic continental shelf and addresses the following topics: shelf physiography and the origin and development of major morphological features on the shelf; results of multichannel seismic reflection and seismic refraction surveys, with emphasis on the sedimentary basins of the shelf; hydrocarbon prospectivity of the shelf; implications of seismic data and sediments obtained in piston cores and DSDP and ODP cores to the origin and development of Antarctica's glacial maritime setting; and sedimentation on the antarctic continental shelf.

E-46345
McKelvey, B.C., **Cainozoic glacial record in south Victoria Land: a geological evaluation of the McMurdo Sound drilling projects,** Geology of Antarctica. Edited by R.J. Tingey, Oxford, Clarendon Press, 1991, p.434-454, Refs. p.449-454.

To gain understanding of two major geological events, the development of the antarctic ice sheet and the uplift of the 3000 km long Transantarctic Mountains, stratigraphic data were obtained through three major drilling projects: the Dry Valley Drilling Project, the McMurdo Sound sediment and tectonic study, and the Cenozoic investigations in the western Ross Sea. The geological setting and drill site descriptions are given. Most of the six drill sites reviewed provide considerable detail of aspects of the Cenozoic glacial history, and the Cenozoic glacial regime is discussed. Included in the discussion are a stratigraphic and structural consideration about Pliocene sequences at the sites; comments on provenance trends reflected in the petrographic data from all sites; and geological features of the Sirius Group and the Victoria Land Basin.

E-46346
Cooper, R.A., Shergold, J.H., **Palaeozoic invertebrates of Antarctica,** Geology of Antarctica. Edited by R.J. Tingey, Oxford, Clarendon Press, 1991, p.455-486, Refs. p.481-486.

Of the Palaeozoic Systems (Cambrian, Ordovician, Silurian?, Devonian, and Permian) represented by invertebrate fossils in Antarctica, only the Cambrian has a relatively full fossil record. Consequently, in outlining the Palaeozoic faunas described or reported from the continent, this account concentrates on the Cambrian; it also reviews the evidence they provide for correlating and dating the fossiliferous sequences, and for assessing the biogeographic affinity of Antarctica in the Palaeozoic. The locations of the main areas discussed in this chapter are shown in a figure. They include the Transantarctic, Ellsworth and Pensacola Mountains, the Argentina Range and Whichaway Nunataks.

E-46347
Thomson, M.R.A., **Antarctic invertebrate fossils: the Mesozoic-Cainozoic record,** Geology of Antarctica. Edited by R.J. Tingey, Oxford, Clarendon Press, 1991, p.487-498, Refs. p.495-498.

Mesozoic marine strata onshore in Antarctica, known only from the Scotia Arc and Antarctic Peninsula region, are discussed. Maps showing the location of place names and the distribution of Mesozoic-Cenozoic sedimentary rocks are presented. It is pointed out that fossiliferous Cenozoic marine strata are also rare, but they have a wide distribution in Antarctica. The special importance of these faunas is emphasized, not only because of their high-latitude occurrence, both at the present day and throughout Mesozoic and Cenozoic time, but because they provide a biostratigraphical record that is more complete than that in many other localities in the Southern Hemisphere. It is also noted that there is a growing body of evidence which suggests that many elements of antarctic and related marine faunas constituted an austral faunal realm, analogous to the northern Boreal Realm, from at least Late Mesozoic time onwards.

E-46348
Truswell, E.M., **Antarctica: a history of terrestrial vegetation,** Geology of Antarctica. Edited by R.J. Tingey, Oxford, Clarendon Press, 1991, p.499-537, Refs. p.528-537.

The history of the land vegetation of Antarctica from the Devonian to the Tertiary, drawing on evidence provided both by plant macrofossils and by palynology, is outlined. It is noted that although most evidence comes from exposures on land, in the recent past offshore drilling and grab-sampling have provided data from sediments on the seafloor which directly reflect the evolution of plant life on land. Plant macrofossils were among the earliest geological specimens collected from Antarctica by the exploring expeditions of the late nineteenth and early twentieth centuries. The evidence provided by such fossils had considerable influence on contemporary ideas of the former linkage between continents, of past continental movement, and of climatic change.

E-46349
Young, G.C., **Fossil fishes from Antarctica,** Geology of Antarctica. Edited by R.J. Tingey, Oxford, Clarendon Press, 1991, p.538-567, Refs. p.562-567.

Fossil fish remains were first described from the Cretaceous-Tertiary deposits of Seymour I., near the northeastern tip of the Antarctic Peninsula. Fishes were also the first group of vertebrates to be discovered as fossils on the antarctic continent itself. However, they remain poorly known, partly due to the difficult collecting conditions and the limited opportunities for recollecting from known sites, but also because the faunas themselves exhibit some anomalous and highly interesting characteristics. These are the subject of current research and are discussed in detail in this chapter. Specialist terms are explained in the enclosed glossary.

E-46350
Colbert, E.H., **Mesozoic and Cainozoic tetrapod fossils from Antarctica,** Geology of Antarctica. Edited by R.J. Tingey, Oxford, Clarendon Press, 1991, p.568-587, Refs. p.584-587.

The currently known history of tetrapod fossils in Antarctica, divided into Triassic, Cretaceous and Cenozoic tetrapods, is reviewed and summarized in a table. It is pointed out that these are still the preliminary stages of the search for the record of vertebrate life on the antarctic continent. There is probably much still to be learned from the Fremouw Formation, from the Cretaceous and Cenozoic sediments on Seymour I., and from Cenozoic sediments in East Antarctica.

E-46351
Behrendt, J.C., **Scientific studies relevant to the question of Antarctica's petroleum resource potential,** Geology of Antarctica. Edited by R.J. Tingey, Oxford, Clarendon Press, 1991, p.588-616, Refs. p.610-616.

After some economic considerations and a brief description of environmental concerns, the geology of Antarctica—with a map of its bedrock topography and locations of sedimentary basins inferred from geophysical data—is summarized. Geophysical studies, multichannel seismic reflection surveys, and drilling studies are reviewed. Doubt is expressed at the end of the chapter that any actual economic development of petroleum resources is likely for several more decades.

E-46352
Rowley, P.D., Williams, P.L., Pride, D.E., **Metallic and non-metallic mineral resources of Antarctica,** Geology of Antarctica. Edited by R.J. Tingey, Oxford, Clarendon Press, 1991, p.617-651, Refs. p.639-651.

This chapter summarizes the known occurrences and deposits of metallic and non-metallic minerals in Antarctica and attempts to describe them within an overall framework of ore genesis. The term mineral 'occurrence' refers to small amounts of a mineral that in larger volumes in other parts of the world has been mined or is an indicator of a mineable deposit. In contrast, a mineral 'deposit' indicates a more substantial quantity of some mineral, although no deposits yet found in Antarctica can be commercially exploited. Mineral 'reserves' are known, identified deposits of mineral-bearing rock that can be extracted profitably with existing technology and under present economic conditions; no reserves exist in Antarctica. Mineral 'resources' consist of mineral deposits that may eventually be recovered; these include known deposits that are not economically or technologically recoverable, and inferred deposits that have not yet been discovered. A list of reports which summarize resources such as sand and gravel, manganese nodules on the ocean floor, icebergs for fresh water, and geothermal energy, is given.

E-46353
Cassidy, W.A., **Meteorites from Antarctica,** Geology of Antarctica. Edited by R.J. Tingey, Oxford, Clarendon Press, 1991, p.652-666, 29 refs.

The Antarctic Ice Sheet contains areas where ice is flowing either only very slowly, or not at all because of barriers either near, or protruding above, the surface. If such sites also are undergoing active ablation, old ice is being exposed continually at the surface. Meteorites fall continually over Antarctica and generally are carried towards the sea by the moving ice. Those that are carried to the ablation zones described above, however, are uncovered at and stranded on the surface, along with other meteorites that may have fallen directly onto that surface during its existence as an area of little or no flow. The meteorites weather only very slowly because they are exposed to very little liquid water; many of the meteorites recovered from these sites therefore are very old falls and thus form a unique subset of the world's meteorite collection. Measured terrestrial ages of antarctic meteorites range between 10,000 and 950,000 yrs. Meteorite stranding surfaces are areas where ancient meteorite falls are preserved and where ancient ice is accessible for sampling. Current work is directed toward determining the ages of ice samples from these stranding surfaces. (Auth. mod.)

E-46356
Dalziel, I.W.D., **Antarctica: a tale of two supercontinents,** *Annual review of earth and planetary sciences,* 1992 Vol.20, p.501-526, Refs. p.523-526.

A series of global paleogeographic maps is used to review present understanding of the development of the antarctic continent and plate, in a framework of both the established Gondwana supercontinent and the hypothetical older supercontinent. (Auth.)

E-46369
Aguirre-Urreta, M.B., Olivero, E.B., **Cretaceous hermit crab from Antarctica: predatory activities and bryozoan symbiosis,** *Antarctic science,* June 1992 4(2), p.207-214, 39 refs.

A hermit crab assigned to *Paguristes* sp. is described from James Ross I. The fossil was obtained from the Gamma Member of the Santa Marta Formation of late Campanian age. The specimen is associated with an external mould of the gastropod *Taioma,* that was encrusted by a colony of ascophoran bryozoans. Another specimen of *Taioma* shows typical predatory marks in the outer lip that are attributed to the action of pagurids. It is concluded that the particular dwelling habits of the hermit crabs, their symbiosis with bryozoan, and their predatory activities were already established by the end of the Cretaceous. (Auth.)

E-46371
Gore, D.B., **Ice-damming and fluvial erosion in the Vestfold Hills, East Antarctica,** *Antarctic science,* June 1992 4(2), p.227-234, 8 refs.

An ice dam with a former impoundment volume of 1.1 million cu m is reported from the Vestfold Hills. The ice of the dam was derived from wind-drifted snow subsequently changed into ice by normal summer melt and freeze processes. The reformation (after 1979 and 1987) and failure of this ice dam (during 1987 and 1990) indicates the potential for the release of geomorphologically significant flows in a polar climate. The origin of a nearby fluvially eroded channel is attributed to the release of an ice-dammed impoundment. The potential of such flows for reworking glacial debris may be important when considering the sedimentology of former proglacial areas. (Auth.)

E-46372
Long, D.J., **Eocene wrasse (Perciformes; Labridae) from Seymour Island,** *Antarctic science,* June 1992 4(2), p.235-237, 18 refs.

A nearly complete lower pharyngeal tooth-plate from a large (over 60 cm long) fossil wrasse (Perciformes: Labridae) was recently recovered from the middle to late Eocene La Meseta Formation on Seymour I. This find increases the number of teleosts from the Eocene of Antarctica to five taxa, and further illustrates the diversity of the ichthyofauna in the Eocene Weddellian Sea prior to wide-scale climatic change in the southern ocean. The fossil wrasse represents the first occurrence of this family in Antarctica, and is one of the oldest fossils of this family from the Southern Hemisphere. Wrasses are not found in antarctic waters today, and probably became extinct during the Oligocene due to a combination of climatic change, loss of shallow-water habitat, and changes in the tropic structure of the Weddell Sea. (Auth.)

E-46373
Feldman, R.M., **James Ross Basin workshop,** *Antarctic science,* June 1992 4(2), p.239-240.

Results of a meeting held at Punderson Lake Lodge, Ohio, on Oct. 6-9, 1991, to examine the current state of our understanding of the geology of the James Ross Basin region, are outlined. Briefly reviewed are the paleontology, topographical mapping, stratigraphy and geochronology of the area.

E-46375
Shniukov, E.F., ed, **Geology and metallogeny of the southern ocean** [Geologiia i metallogeniia IUzhnogo okeana], Kiev, Naukova dumka, 1991, 192p., In Russian. 103 refs.

This volume, written by various contributors, is based on data collected during the 1982-1983 and 1987-1988 Soviet antarctic expeditions; it consists of 5 chapters dealing essentially with the deep-sea sediments of the southern ocean. Ch. 1 is an outline of the history of antarctic exploration. In Ch. 2, which deals with the conditions of the southern ocean sedimentation, the discussion covers the geological structure and history of the formation of Antarctica, bottom topography, antarctic continental margins and its basins, and the hydrological and meteorological regimes. Ch. 3 describes the types of deep-sea sediments and their granulometric, mineral, and chemical composition. The last 2 chapters consider the stratigraphy, geochronology, mineral resources and metallogeny of deep-sea sediments, including lithological features, sediment foraminifera, diatom remains, isotopic age and sedimentation rate, ferromanganese nodules in the southern ocean, nodule and crust morphology, and geochemistry and origin of the ferromanganese deposits.

E-46397

Benoit, P.H., Sears, H., Sears, D.W.G., **Natural thermoluminescence of meteorites. 4. Ordinary chondrites at the Lewis Cliff ice field,** *Journal of geophysical research,* Apr. 10, 1992 97(B4), p.4629-4647, Refs. p.4646-4647.

Natural thermoluminescence (TL) measurements have been made on 302 meteorites from the vicinity of the Lewis Cliff in the Beardmore region of Antarctica. The data provide information on terrestrial age and unusual radiation and thermal histories, which, in turn, are helpful in identifying fragments of a single fall and in understanding ice sheet movements and the mechanisms by which meteorite concentration occurs at this site. The present data with data for induced TL, class, find location, hand-specimen descriptions and mineral composition have enabled 70 of the present samples to be assigned to 27 groups of "paired" meteorites, with from 2 to 5 meteorites in each group. The distribution of meteorites on the ice, the shape of the fields of "paired" meteorites, and trends in the natural TL data indicate that there is a western component to the movement of the ice at this location, as well as the previously supposed movement to the north. This western vector probably explains the concentration of meteorites along the western edge of the ice tongue. (Auth. mod.)

E-46401

Funaki, M., Yoshida, M., Vitanage, P.W., **Natural remanent magnetization of some rocks from southern Sri Lanka,** Study of geologic correlation between Sri Lanka and Antarctica (1988-1989), edited by Y. Hiroi and Y. Motoyoshi, 1990, p.107-117, 10 refs.

DLC QE652.55.S72S78

Paleomagnetic studies were performed on rock samples from southern Sri Lanka. When the VGPs were rotated along a pole position (Lat=5.3S, Lon=23.8E with angle -100.5 deg), which was decided by adjusting the VGPs of Tonigala granite, Gallodai dolerite and the previous results from East Antarctica, they were overlaid on the Cambro-Ordovician areas of East Antarctica, for the Tonigala granite and Pink granite and the Mesozoic for Gallodai dolerite. The results support the idea of juxtaposition of Sri Lanka with Lützow-Holm Bay in East Antarctica. (Auth. mod.)

E-46402

Yoshida, M., Funaki, M., Vitanage, P.W., **Juxtaposition of India, Sri Lanka, Antarctica in Proterozoic to Mesozoic Gondwana,** Study of geologic correlation between Sri Lanka and Antarctica (1988-1989), edited by Y. Hiroi and Y. Motoyoshi, 1990, p.118-131, Refs. p.126-129.

DLC QE652.55.S72S78

The Highland Series and Southwestern Group (Proterozoic) of Sri Lanka are correlated with the granulite facies part of the Lützow-Holm Complex (Proterozoic) of East Antarctica on the basis of similar lithology, structural characteristics, structural trend, tectonothermal history ranging from early Proterozoic to Ordovician, and the pressure-temperature-time path of the main metamorphism. Conformity of fracture-lineament systems of Sri Lanka and Antarctica, and an improved fit of the 2000 m isobaths of India-Sri Lanka-Antarctica are attained by fitting Sri Lanka onto Lützow-Holm Bay, and Enderby Land to the embayment in the east coast of peninsular India. This involves a clockwise rotation of *ca* 30 deg followed by *ca* 80 km northwards movement of Sri Lanka relative to India. The general juxtaposition of India-Sri Lanka-Antarctica is considered to have existed during a period from Early Proterozoic to Middle Mesozoic. (Auth. mod.)

E-46403

Motoyoshi, Y., **Review of *P-T* evolution of high-grade metamorphic terranes in East Antarctica,** Study of geologic correlation between Sri Lanka and Antarctica (1988-1989), edited by Y. Hiroi and Y. Motoyoshi, 1990, p.132-139, Refs. p.137-139.

DLC QE652.55.S72S78

P-T evolution of high-grade metamorphic rocks in East Antarctica is summarized in order to discuss the geological correlation with Sri Lankan granulites. On the basis of petrographical evidence, the East Antarctic Shield is classified into several geological units with respect to the evolutional style. Among them, the Lützow-Holm Complex has a distinctive *P-T* trajectory suggested by the mode of occurrence of relict minerals (kyanite and staurolite) in aluminous metapelites containing sillimanite. Similar petrographical evidence has been also reported from the Highland Series and the Southwestern Group of Sri Lanka, which suggests strong similarity with the Lützow-Holm Complex. (Auth.)

E-46440

Xiong, H., Cui, Z., **Field observation and research of sorted circle mechanism in subantarctic periglacial environment, Antarctica,** *Antarctic research (Chinese edition),* Dec. 1991 3(4), p.1-10, In Chinese with English summary. 5 refs.

During a study of sorted circle mechanism, carried out on King George I. in 1989-1990, the relationship between the gravel size of the sorted circle edge and slope was determined. It was found that the circles developed well and in great numbers when the edge gravel size was under 15 cm. The small gravel distributed on the surface of the circle center moved to the edge during the freeze-thaw season, and back to the center during the thaw season (summer). The general displacement was toward the edge. The frost heaving of the surface layer was greater than that of the deeper layer in the sorted circle center. (Auth. mod.)

E-46442

Li, H., **Early Tertiary palaeoclimate of King George Island, Antarctica,** *Antarctic research (Chinese edition),* Dec. 1991 3(4), p.18-23, In Chinese with English summary. 14 refs.

This study shows that the fossil flora from Fildes Peninsula consists of more than 40 forms of ferns, gymnosperms and angiosperms mostly resembling the Early Tertiary South American paleoflora. Analysis of samples suggests that the plants grew under the following environmental conditions: a mean annual temperature of approximately 14-16 C; a mean temperature of the coldest month of about 10 C; a mean temperature of the warmest month of about 20 C; a mean annual range of temperature of 7-10 C; no solar radiation during winter; and high precipitation, more than 1000 mm per year. To explain the warm and humid climate during the growing of the plants, it is proposed that a South Pacific warm current transported huge quantities of heat from the equator to Gondwanaland, and that with the development of the Antarctic Circumpolar Current about 38 m.y.a., the antarctic climate began to deteriorate.

E-46450

Zhu, C., Cui, Z.J., Xiong, H.G., **Analysis of periglacio-geomorphic processes on Fildes Peninsula, King George Island, Antarctica,** *Antarctic research (Chinese edition),* Sep. 1991 3(3), p.25-38, In Chinese with English summary. 18 refs.

Periglacial-geomorphological processes on Fildes Peninsula, based on repeated surveying, pitting, geoelectrical prospecting, artificial watering, geothermal measurements and sample analyses, and the study of the sediment structural features of rock glacier, talus, sorted circles, debris flower, and striated soil, are discussed. The influence of salty sediments on electrical resistivity and substantial migration are noted. It is found that the rock glacier and striated soil are active in summer. The stone circles are defined as the beach-gravel type, with convex-shaped table, and debris type, with bowl-shaped frost table. It is concluded that the periglacial geomorphology of Fildes Peninsula is typical of that of subantarctic islands. (Auth. mod.)

E-46451

Wang, X., **Preliminary study on REE in the sediments of the Great Wall Bay, Antarctica,** *Antarctic research (Chinese edition),* Sep. 1991 3(3), p.39-44, In Chinese with English summary. 8 refs.

The source of sediments from the Great Wall Bay is discussed, based on the analysis of their REE. It is found that the concentration, distribution model, and character parameter of the REE in the sediments are similar to those of the volcanic rocks exposed on the Fildes Peninsula: the total REE of each sample is not high; the samples have similar REE distribution patterns, which are slightly enriched in LREE; and the REE character parameters show island-arc tholeiite and calcalkaline basalt characteristics. It is concluded that the main source of the bay sediments should be the weathering products of the basement rocks on the peninsula. (Auth. mod.)

E-46481

Gillieson, D., ed, Fitzsimons, S., ed, **Quaternary research in Australian Antarctica: future directions. Proceedings of a meeting held in Canberra, 6-7 Dec. 1990,** Special Publication No.3, Department of Geography and Oceanography, University College, Australian Defence Force Academy, Canberra, 1991, 119p., Refs passim. For individual papers see 46-4032 through 46-4037 or E-46482 through E-46492.

DLC QE696.Q353

This is a collection of papers presented at a symposium held in Canberra on Dec. 6-7, 1990, to review the status of Quaternary research in the Australian Antarctic Territory. In addition to 11 full-length papers, the volume contains a list of participants and 12 recommendations of the meeting. These recommendations outline needs that will have to be met for continued success in Quaternary research in Antarctica.

E-46482

Adamson, D., Darragh, A., **Field evidence on Cainozoic history and landforms in the northern Prince Charles Mountains, East Antarctica,** Quaternary research in Australian Antarctica: future directions, edited by D. Gillieson and S. Fitzsimons. Special Publication No.3, Department of Geography and Oceanography, University College, Australian Defence Force Academy, Canberra, 1991, p.5-14, 6 refs.

DLC QE696.Q353

Field observations of glacial deposits, fossil marine mollusca, palaeo-topography, lake bathymetry, and present glacial and non-glacial landforms were carried out in 1988-89 in the northern Prince Charles Mountains flanking the western side of the Lambert Glacier and Amery Ice Shelf. The area studied was from Dovers Base to Else Platform and south to Nilsson Rocks, focussing on the Beaver Lake-Radok Lake region and nearby massifs. The distribution of till and marine fossils, the underwater vee-shape and great depth (to at least 230 m below present sea level) of Pagodroma Gorge across the floor of Beaver Lake, and non-glacial landforms are consistent with the Beaver Lake area (Amery Oasis), being unaffected by erosive fast flowing ice of major outlet glaciers since at least late Tertiary time. A palaeo land surface that predates probable late Tertiary fossiliferous till has been identified. Local mountain glaciers are now contained within their lateral and terminal moraines. Large regional glaciers, tributary to the Lambert Glacier and Amery Ice Shelf, are now recessive with ice surfaces from a few to over 100 m below most recent lateral moraines. The observations are consistent with minimum rather than maximum models of the antarctic ice sheet during Quaternary glacial periods. (Auth. mod.)

E-46483

Mabin, M.C.G., **Glacial history of the Lambert Glacier, Prince Charles Mountains area, and comparisons with the record from the Transantarctic Mountains,** Quaternary research in Australian Antarctica: future directions, edited by D. Gillieson and S. Fitzsimons. Special Publication No.3, Department of Geography and Oceanography, University College, Australian Defence Force Academy, Canberra, 1991, p.15-23, 21 refs.

DLC QE696.Q353

Out of phase response of ice sheet and local alpine glaciers has been demonstrated from the Transantarctic Mountains. In this area, large East Antarctic Ice Sheet outlet glaciers drain through the Transantarctic Mountains to feed into the Ross Ice Shelf. Evidence exists that during the Last Glaciation the ice sheet expanded by only 30-100 m while its outlet glaciers thickened by 800-1000 m in their lower reaches in response to widespread grounding of the Ross Ice Shelf. No similar pattern has been observed in the Northern Prince Charles Mountains-Amery Ice Shelf area. On Fisher Massif lateral moraines indicate an ice surface increase of less than 100 m in the region of the present Lambert Glacier grounding line. Further down glacier around Beaver Lake there is no evidence for an increase in surface elevation of either the Lambert Glacier or the large outlet glaciers. This suggests that during the Last Glaciation the Amery Ice Shelf did not become grounded, and the Lambert Glacier system was responding differently from the outlet glaciers that drain into the Ross Embayment area. (Auth. mod.)

E-46484

Fitzsimons, S.J., **Geomorphic development of the Vestfold Hills: questions regarding Holocene deglaciation,** Quaternary research in Australian Antarctica: future directions, edited by D. Gillieson and S. Fitzsimons. Special Publication No.3, Department of Geography and Oceanography, University College, Australian Defence Force Academy, Canberra, 1991, p.25-35, 9 refs.

DLC QE696.Q353

Four mechanisms of moraine development in the Vestfold Hills, inferred from analysis of the ridges and ice marginal depositional processes, are small push moraines, larger moraines that form by erosion and redeposition of large blocks of fjord-bottom sediment, ice-contact screes and fans, and moraines that form along the axial areas of major englacial folds. The principal trend of the major moraines of the hills together with an analysis of their sedimentary structures and C-14 dates from marine shells suggest that most of the ridges have been formed by northwesterly flowing ice that excavated glaciomarine sediment from fjords. Taken together, the mapping of glacial depositional landforms and observations of ice marginal depositional processes suggest that the Vestfold Hills may have been glaciated by a marginal expansion of the Sörsdal Glacier. C-14 dates from ice marginal landforms suggest that the deglaciation of the Vestfold Hills consisted of a rapid early Holocene retreat of the margin of the Sörsdal Glacier south of its present position, followed by a readvance. The questions raised by this work are moving toward a re-examination of the pattern and timing of the Holocene deglaciation of the Vestfold

Hills; it is suggested that the most productive way to proceed is through a study on the raised beaches and isostatic history of the area. (Auth. mod.)

E-46485

Gore, D.B., **Examples of ice damming of lakes in the Vestfold Hills, East Antarctica, with implications for landscape development,** Quaternary research in Australian Antarctica: future directions, edited by D. Gillieson and S. Fitzsimons. Special Publication No.3, Department of Geography and Oceanography, University College, Australian Defence Force Academy, Canberra, 1991, p.37-44, 5 refs.

DLC QE696.Q353

A large, abandoned channel in the Vestfold Hills is largely attributed to repeated failure of an ice dam. Peak discharge of one flood was estimated at 57 cu m/s, and the total flood volume was estimated at 820,000 cu m. Reconstructed impoundment volume is comparable to the volume of water released during the 1987 failure of a nearby ice dam. Near Boulder Hill in the southeast, and possibly also in the west of the Hills, these floods have been important mechanisms for reworking and concentrating glacial debris, creating large alluvial fans. (Auth.)

E-46486

Selkirk, P.M., McBride, T.P., Keenan, H.M., Adamson, D.A., **Palaeolake deposits and cliff retreat on subantarctic Macquarie Island,** Quaternary research in Australian Antarctica: future directions, edited by D. Gillieson and S. Fitzsimons. Special Publication No.3, Department of Geography and Oceanography, University College, Australian Defence Force Academy, Canberra, 1991, p.45-53, 13 refs.

DLC QE696.Q353

On Macquarie I. six palaeolake deposits dating from terminal Pleistocene to early-mid Holocene have been found at the top of cliffs which bound the island's plateau. They are interpreted as remnants of former plateau lakes which extended beyond the present plateau margin, and which were drained when marine erosion caused cliff retreat. Examination of the fossil plants (angiosperms, bryophytes, diatoms) preserved in the deposits has allowed preliminary interpretations of lacustrine conditions prior to lake drainage. (Auth.)

E-46487

Gillieson, D., **Diatom stratigraphy in antarctic freshwater lakes,** Quaternary research in Australian Antarctica: future directions, edited by D. Gillieson and S. Fitzsimons. Special Publication No.3, Department of Geography and Oceanography, University College, Australian Defence Force Academy, Canberra, 1991, p.55-67, 14 refs.

DLC QE696.Q353

The Larsemann Hills have been progressively exposed by glacial retreat since 9000 B.P. The offshore islands were ice free by that time, while the present coastline was exposed by 4500 B.P. Lake basins next to the polar plateau have been exposed in the last few hundred years. The freshwater lakes studied so far have evolved from proglacial lagoons with oligohalobous diatoms to mildly saline lakes with alkaliphilous or polyhalobous diatoms, affected by periodic influxes of salt water from sea spray and surges produced by glacial calving. The diatom assemblages increase in species diversity following marine incursion or influence. The major changes are therefore due to the postglacial recovery of sea level, rather than any intrinsic chemical evolution of the lake waters. Incipient eutrophication of some coastal lakes needs to be carefully monitored if undesirable human influences are to be avoided. (Auth. mod.)

E-46488

De Deckker, P., Kiss, E., Chivas, A.R., **Suitability of lakes on the Windmill Islands in Antarctica for palaeolimnological studies,** Quaternary research in Australian Antarctica: future directions, edited by D. Gillieson and S. Fitzsimons. Special Publication No.3, Department of Geography and Oceanography, University College, Australian Defence Force Academy, Canberra, 1991, p.69-77, 4 refs.

DLC QE696.Q353

Forty-three waterbodies were sampled in 1983 in the vicinity of Casey Station on the Windmill Is. A substantial data base was gathered with the following chemical and physical parameters obtained: major ions (Na, K, Mg, Ca, Cl, SO4, HCO3), minor elements (Sr, Li, Rb, Cs, Fe, Mn, Cu, Si, F, Br, PO4, NO3), plus dissolved oxygen, conductivity, water and air temperature. The undersaturation characteristics of the waters suggest that the lakes are unsuitable for palaeolimnological studies using diatoms or calcite/aragonite skeletons. The saturation of a few of the waters for magnetic minerals may perhaps lead to the search for suitable palaeomagnetic records if sufficient sediments are found at the bottom of lakes. The waters' molar Na+K/Mg+Ca ratio is characteristic of their locations on the Windmill Is., with some waters from specific areas being obviously chemically distinct from those of others. The explanation for such chemical "provincialism" is clearly related to the particular geology of the various areas drained by the lakes. The local lithological control on water chemistry is also detected by comparing Mg with Si in the waters. Comments are also briefly made on the effect of penguin rookeries and human activity on the chemistry and other properties of the lakes in the area studied. (Auth. mod.)

E-46489

Colhoun, E.A., Adamson, D.A., **Raised beaches of the Bunger Hills, Antarctica,** Quaternary research in Australian Antarctica: future directions, edited by D. Gillieson and S. Fitzsimons. Special Publication No.3, Department of Geography and Oceanography, University College, Australian Defence Force Academy, Canberra, 1991, p.79-84, 9 refs.

DLC QE696.Q353

Raised beaches are widely distributed in the Bunger Hills and are of middle to late Holocene age. They usually occur up to 8.5 m (maximum 10 m) above HWM and have been uplifted at 1.6 m/ka during the last 6000 yrs. The oasis was approximately its present size by 5600 yrs B.P. and the Antarctic Ice Sheet edge has remained almost stable since. Total Holocene uplift is estimated at 47 m. Early Holocene beaches remain below present sea level. Last glaciation ice cover was thin. It is estimated to have been more than 150 m but probably not over 300 m. (Auth.)

E-46490

Kirk, R.M., **Raised beaches, Late Quaternary sea-levels and deglacial sequences on the Victoria Land coast, Ross Sea, Antarctica,** Quaternary research in Australian Antarctica: future directions, edited by D. Gillieson and S. Fitzsimons. Special Publication No.3, Department of Geography and Oceanography, University College, Australian Defence Force Academy, Canberra, 1991, p.85-105, 15 refs.

DLC QE696.Q353

The paper describes the character and distribution of raised coastal features ranging from +2 m to +32 m altitude along the Victoria Land coast and on islands of the Ross Sea. The distribution of features is discussed with respect to ice-sheet reconstructions and to sea-level change models. Problems inherent to this line of investigation include dating of the marine limit, and distinct spatial grouping of the coastal land form types. These problems notwithstanding, distinctive patterns of ridge heights and sequences occur that are similar to those expected from sea-level change models. It is concluded that Ross Sea ice volumes at 18,000 yr B.P. have been over-estimated in geophysical modelling of global Holocene relative sea-level changes, and that ice thicknesses on the central Victoria Land coast have been over-estimated in ice mass reconstructions. Acceptance of a smaller ice mass and local thickness necessitates re-interpretation of the deglacial sequence in the Ross Sea embayment and considerably increases the pertinence of the raised beach record to this exercise. (Auth. mod.)

E-46491
Quilty, P.G., **Sources of data on the Quaternary of East Antarctica,** Quaternary research in Australian Antarctica: future directions, edited by D. Gillieson and S. Fitzsimons. Special Publication No.3, Department of Geography and Oceanography, University College, Australian Defence Force Academy, Canberra, 1991, p.107-114, 11 refs.
DLC QE696.Q353

The need to document changes over the antarctic Quaternary, to allow the differentiation of natural and possible human induced changes to the Earth's climate, is emphasized. A plea is made for a recognition of the value of obtaining offshore reference sections against which to calibrate the onshore areas, which yield a great deal of information about shorter time intervals. Previous work offshore, and future onshore programs—including research on Windmill Is. and Vestfold Hills—are briefly reviewed.

E-46492
Stone, J., **Determining exposure ages using cosmogenic isotopes,** Quaternary research in Australian Antarctica: future directions, edited by D. Gillieson and S. Fitzsimons. Special Publication No.3, Department of Geography and Oceanography, University College, Australian Defence Force Academy, Canberra, 1991, p.115-116.
DLC QE696.Q353

A variety of isotopes produced in minerals by cosmic ray bombardment can be used to measure the exposure ages of rocks at the earth's surface. Because the build-up of cosmic ray- produced isotopes records residence at the surface rather than geologic age, cosmic ray exposure ages hold particular promise in studies of geomorphology and sediment transport. The range of ages measurable with cosmogenic isotope techniques varies according to the choice of isotopes and its production rate at the site of interest; exposure ages as low as a few hundred years have been measured for Hawaiian lava flows using He-3 produced in olivine, whilst several-million year ages have been estimated for rock surfaces in Antarctica from Al-26 and Be-10 concentrations in quartz.

E-46517
Cassidy, D.S., **Antarctic Marine Geology Research Facility and Core Library, 1989-1990,** *Antarctic journal of the United States,* 1990 25(5), p.287-288, 6 refs.

The activities of National Science Foundation's Antarctic Marine Geology Research Facility and Core Library for the period June 1, 1989 to May 31, 1990 included the distribution of a total of 3,071 samples—from 163 different cores and one grab specimen recovered aboard 25 cruises of 3 vessels, and from 2 drill holes of the Dry Valley Drilling Project—to 14 scientists at 10 institutions in Australia, Brazil, Canada, Switzerland and the United States. This total, nearly 83% of the combined total number of samples distributed during the past 3 years, represents a significant increase in sampling activity. A compendium of sampling for the year is presented.

E-46518
Cassidy, D.S., **Bibliographic database for project collections of the Antarctic Marine Geology Research Facility and Core Library,** *Antarctic journal of the United States,* 1990 25(5), p.288-290, 24 refs.

The U.S. National Science Foundation's Antarctic Marine Geology Research Facility and Core Library at Florida State University has received, since 1960, more than 17,000 m of marine sediment cores recovered from beneath the southern ocean and on the continent of Antarctica. From these, and associated components of the marine collections, more than 200,000 samples have been distributed to 286 investigators representing 120 institutions of 16 countries. Data derived from the results of analyses of these samples appear in many publications. A computer-maintained bibliographic database has been established for this (and related) literature using a text-based information storage and retrieval system designed for use with both textural and numeric information. Currently (May 31, 1990), the bibliography comprises a total of 1,480 references. A figure shows the distribution of this total over the past 35 years according to the number of titles published each year. Shown also are the approximate ranges of activity of project/vessel operations involving the recovery of materials shipped to the Facility.

E-46570
Crozaz, G., McKay, G., **Rare earth elements in Angra dos Reis and Lewis Cliff 86010, two meteorites with similar but distinct magma evolutions,** *Earth and planetary science letters,* Mar. 1990 97(3/4), p.369-381, 27 refs.
DLC QE1.E12

Rare earth element (REE) and selected trace element abundances were measured with an ion microprobe in individual grains of merrillite, fassaite, olivine, kirschsteinite and plagioclase of LEW 86010, the second known angrite, and compared with measurements in merrillite and fassaite of Angra dos Reis (ADOR). The rare merrillite is highly enriched in REE; the REE patterns show steep decreases from La about 3,300xCl to Tm about 100xCl in LEW 86010, and from La about 1,500xCl to Tm about 130xCl in ADOR. REE patterns in fassaite of both meteorites are similar although concentrations are higher in ADOR. Whereas ADOR pyroxenes show a high degree of equilibration, the LEW 86010 pyroxenes show much variation in composition. The abundances of the REE, Zr, Al and Ti correlate positively with Fe/Fe+Mg and those of Cr, Sc and V correlate negatively, consistent with an igneous origin in a closed system. Pyroxene and plagioclase cores in LEW 86010 formed in equilibrium with a melt whose composition is close to that of the meteorite bulk composition. The ADOR melt had higher REE concentrations but a lower Fe/Mg ratio than that of LEW 86010. Despite numerous common characteristics, the two meteorites were produced in separate magmatic events involving similar but distinct processes and parent melts. The unusual angrite composition is not due to purely nebular processes. (Auth.)

E-46575
Smellie, J.L., Hofstetter, A., Troll, G., **Fluorine and boron geochemistry of an ensialic marginal basin volcano: Deception Island, Bransfield Strait, Antarctica,** *Journal of volcanology and geothermal research,* Feb. 1992 49(3/4), p.255-267, Refs. p.265-267.

The initial results are presented of a quantitative investigation of the volatile geochemistry of Deception I., an active volcano situated near the spreading axis of a Quaternary ensialic marginal basin. Fluorine contents in Deception I. magmas (112-461 ppm) are comparable with lavas from a range of tectonic environments, but F-K2O relationships most closely compare with continental flood basalts and lavas from island arcs and some marginal basins. Boron contents are high (4.3-16.3 ppm) and the values overlap with those of arc lavas; they provide strong support for the presence of a mantle source component derived from the slab subducted at the coeval trench. Both

F and B acted incompatibly in Deception I. magmas, but there is significant variation in incompatible-element ratios such as K/F, K/B, P/F, P/B, which strongly suggests that the magmatic system was open to some or all of these elements during differentiation. The variations in these ratios also provide evidence for the presence of at least two stages in the magmatic evolution of the volcano. (Auth. mod.)

E-46576
Grew, E.S., **Dissakisite-(Ce), a new member of the epidote group and the Mg analogue of allanite-(Ce), from Antarctica,** *American mineralogist,* Nov.-Dec. 1991 76(11-12), p.1990-1997, Refs. p.1996-1997.

Dissakisite-(Ce), ideally Ca(Ce,La)MgAl2Si3O12(OH), occurs in marble on Balchen Mountain, East Antarctica in association with calcite, dolomite, forsterite, clinohumite, phlogopite, chlorite, ilmenite-geikielite solid solution, spinel, zircon, pyrrhotite, a rare-earth silicate, and a calcium zirconium titanium oxide. Results of electron microprobe analyses of the more magnesian grain (core) are given. Dissakisite-(Ce) is inferred to have formed at about 600 C as a result of amphibolite-facies metamorphism superimposed on a regional granulite-facies terrain, for which the estimated P-T conditions are 7 kbar, 700-750 C. The name is derived from the Greek, dissákis, meaning "twice over," for a Mg analogue of allanite having been described twice. (Auth. mod.)

E-46578
Li, Z.N., Liu, X.H., Shang, R.X, **Characteristics and mechanism of island-arc volcanism on the central and southern Fildes Peninsula, King George Island, Antarctica,** *Acta geologica sinica,* Mar. 1992 5(1), p.39-57, 13 refs.

The volcanic rock series on the Fildes Peninsula is the product of the later subduction of the Pacific plate beneath the antarctic plate. It consists mainly of basalt, basaltic andesite and andesite with minor dacite. Its isotopic ages range from 64.6 to 43 Ma, belonging to Paleocene to Eocene. Volcanism in the area may be divided into two phases. Isotope geochemical studies indicate that the primitive magma in the area originating by partial melting in the upper mantle underwent fractional crystallization and ascended to the high-level (shallow) magma chamber. Before eruption the primitive basalt-andesitic magma was subjected to differentiation in the high-level magma chamber, forming zones of derivative magmas of different compositions. In various phases magma-conducting faults experienced periodic extension and cut through various derivative magma zones in different parts of the peninsula, leading to the eruption of magmas of different compositions on the surface and the formation of volcanic rock associations of corresponding compositions. (Auth.)

E-46584
Berkman, P.A., **Circumpolar distribution of Holocene marine fossils in antarctic beaches,** *Quaternary research,* Mar. 1992 37(2), p.256-260, Refs. p.259-260.

The composite frequency of radiocarbon ages for Holocene marine fossils from beaches around Antarctica is significantly different than random. Variations in the frequency of fossil ages coincide with the timing of Holocene climate changes inferred from antarctic ice cores, subantarctic lakes, polar and alpine moraines, and sea level. Extant antarctic marine species that occur as fossils in beaches may reflect coastal meltwater impacts associated with ice sheet marginal fluctuations that were circumpolar during the Holocene. (Auth.)

E-46585
Storey, B.C., **Antarctica: the cornerstone of two supercontinents,** *NERC news,* July 1992 No.22, p.32-35.

The geological past of Antarctica and its links with much larger supercontinents is described. A time chart, with plate tectonic history of Antarctica, and a Gondwana reconstruction 180 m.y.a., illustrating the distribution of igneous rocks and the possible location of mantle plumes just prior to breakup, are presented.

E-46589
Xiao, X.Y., Lipschutz, M.E., **Labile trace elements in carbonaceous chondrites: a survey,** *Journal of geophysical research,* June 25, 1992 97(E6), p.10,199-10,211, 42 refs.

Radiochemical neutron activation analysis data are reported for Co, Au, Ga, Rb, Sb, Ag, Se, Cs, Te, Zn, Cd, Bi, Tl, and In (ordered by increasing putative volatility in primary nebular processes) in 42 C2-C6 chondrites, all but 3 from Antarctica. From these and literature data for 19 additional chondrites, C1-normalized concentrations of the nine most volatile elements (Ag to In) are nearly constant in most meteorites. Trace element trends in 39 antarctic and 22 non-antarctic carbonaceous chondrites are similar: no evidence exists for substantial alteration by weathering of samples in Antarctica, nor do the data reflect modification by open-system parent body metamorphism at 500 C. Volatile element concentrations and siderophile ratios (Au/Co and Ga/Co) define continua which correlate at statistically significant levels. Carbonaceous chondrites sample not a few compositionally distinct parents, but rather a compositional continuum in which parent materials forming under more oxidizing conditions incorporated lesser complements of volatiles, essentially unfractionated from cosmic composition. This may well reflect the range of formation conditions (temperature, duration, and water/rock ratios) represented by oxygen isotope variations during preterrestrial aqueous alteration of parent materials. (Auth.)

E-46604
Matsumoto, G.I., Friedmann, E.I., Watanuki, K., Ocampo-Friedmann, R., **Novel long-chain *anteiso*-alkanes and *anteiso*-alkanoic acids in antarctic rocks colonized by living and fossil cryptoendolithic microorganisms,** *Journal of chromatography,* May 15, 1992 598(2), p.267-276, 36 refs.

Saponified extracts of rock samples colonized by cryptoendolithic microbial communities from the McMurdo Dry Valleys were separated into hydrocarbon and fatty acid fractions by silica gel column chromatography. Hydrocarbons and methyl esters of fatty acids were analyzed by capillary gas chromatography-mass spectrometry. A suite of long-chain *anteiso*-alkanes and *anteiso*-alkanoic acids was detected in many samples, together with straight-chain, branched and/or cyclic and acyclic isoprenoid compounds. These novel compounds are probably derived from unidentified heterotrophic bacteria or symbiotic processes in a unique microbial community in the antarctic cold desert, and suggest the occurrence of a special biosynthetic pathway. Long-chain *anteiso*-alkanes are probably formed through microbial decarboxylation of corresponding *anteiso*-alkanoic acids. They may serve as new biomarkers in environmental and geochemical studies. (Auth.)

E-46606
Zamaloa, M.C., **New species of *Nothofagidites, N. americanus,* from Patagonia and Antarctica,** *Review of palaeobotany and palynology,* May 22, 1992 72(1/2), p.49-53, 11 refs.

Nothofagidites americanus n. sp. (fossil pollen of *Nothofagus)* is described from Patagonic and antarctic deposits. It belongs to the *Nothofagus menziesii* type, and is distinguished from the Australian/-New Zealand *N. asperus* by the smaller size and shorter colpi. It partially embraces South American material previously described as *N. asperus* and *N. suggatei.* The new species has a known stratigraphic range from Maastrichtian to Lower Miocene. (Auth.)

E-46610

Larter, R.D., Barker, P.F., **Neogene interaction of tectonic and glacial processes at the Pacific margin of the Antarctic Peninsula,** *International Association of Sedimentologists. Special publication,* 1991 No.12, Sedimentation, tectonics, and eustasy: sea level changes at active margins, edited by D.I.M. Macdonald, p.165-186, 69 refs.

DLC QE571.S4185 1991

The Antarctic Peninsula was a magmatic arc subducting Pacific Ocean floor throughout the Mesozoic. During the Cenozoic, subduction ceased at each of a series of ridge-crest-trench collisions, which migrated northeast along the margin. Multichannel seismic profiles across the Pacific margin of the Antarctic Peninsula show evidence of post-collision uplift, followed by subsidence. During Pliocene-Pleistocene time, ice sheets have grounded out to the shelf edge at times of glacial maximum, transporting sediment that has extended the outer shelf. Subsidence of the margin has preserved a unique sedimentary record of ice-sheet advances, which provides the opportunity of looking closely at the hypothesized relationship between change in grounded ice volume and global sea-level change.

E-46611

Pirrie, D., Whitham, A.G., Ineson, J.R., **Role of tectonics and eustasy in the evolution of a marginal basin: Cretaceous-Tertiary Larsen Basin, Antarctica,** *International Association of Sedimentologists. Special publication,* 1991 No.12, Sedimentation, tectonics, and eustasy: sea level changes at active margins, edited by D.I.M. Macdonald, p.293-305, 42 refs.

DLC QE571.S4185 1991

A 5-6 km thick Cretaceous-Tertiary marginal basin succession is exposed in the James Ross I. area (northern Antarctic Peninsula). Deep-marine fan facies and slope-apron facies (c. 2.5 km) are succeeded by shallow-marine shelf-deltaic deposits (c. 3 km). The deep-marine sedimentary rocks were deposited adjacent to a tectonically active basin margin and show little evidence of relative sea-level change. Intra- and extra-basinal tectonics were the major control on sedimentation; eustatic events have not been recognized. During the (?)Coniacian a peak in proximal volcanism increased sediment supply to the basin in the James Ross I. area. Continued tectonic uplift and passive basin filling led to partial shallowing within the basin. Widespread shallow-marine sedimentation did not develop until the Santonian-Campanian, coinciding with basin uplift, widening of the shelf, and decreased tectonic activity. Post-Santonian sedimentation was partially controlled by minor base-level changes, possibly eustatically driven, although the current biostratigraphic resolution does not allow direct correlation. (Auth.)

E-46612

Butterworth, P.J., **Role of eustasy in the development of a regional shallowing event in a tectonically active basin: Fossil Bluff Group (Jurassic-Cretaceous), Alexander Island, Antarctica,** *International Association of Sedimentologists. Special publication,* 1991 No.12, Sedimentation, tectonics, and eustasy: sea level changes at active margins, edited by D.I.M. Macdonald, p.307-329, 64 refs.

DLC QE571.S4185 1991

A 7 km thick Kimmeridgian-Albian fore-arc basin succession, unconformably overlying an accretionary complex, is exposed on the east coast of Alexander I. adjacent to the Antarctic Peninsula. The basin fill represents a single regressive megasequence, strongly controlled by active faulting along the arc-basin margin. This regressive megasequence comprises a large-scale (minimum 440 m thick) slope-collapse deposit overlain by a 2.2 km thick Tithonian-Berriasian sequence of proximal submarine fan deposits that record three tectonic pulses of coarse clastic sediment input. Intra-basinal synsedimentary tectonism was the primary control on the development of the overlying 1 km thick slope mudstone sequence (Valanginian-Aptian). The basin fill is capped by an Aptian-Albian shallow-marine and terrestrial sandstone sequence 3.5 km thick, which is probably diachronous across the basin. A clearly defined petrographic arc-unroofing trend is documented by a shift in conglomerate clast composition and sandstone petrofacies, and indicates a substantial episode of arc uplift and dissection during Tithonian and Berriasian times. This overall 7 km thick regressive megasequence is punctuated during the late Berriasian by a well-exposed abrupt facies from inner fan channel, deep marine conglomerates to a 70-90 m thick shallow marine storm-dominated shelf sandstone unit. This synchronous basin-wide event is interpreted as reflecting a sedimentary response, at least in part, to a short-term eustatically controlled sea-level fall.

E-46634

Steele, I.M., **Olivine in antarctic micrometeorites: comparison with other extraterrestrial olivine,** *Geochimica et cosmochimica acta,* July 1992 56(7), p.2923-2929, 21 refs.

Antarctic micrometeorite particles range from porous unmelted samples to completely melted spheres. Of approximately 175 particles examined, twenty-six contain 5 microns or larger Mg-rich olivine with compositions similar to those found in unequilibrated meteorites. Electron probe analyses for minor elements show high levels of Cr in micrometeorite olivine above those found in C3 and UOC olivines, but closely matching levels found in C2 olivines. Very Mg-rich (FeO $<$1.0 wt%) olivines are rare in these micrometeorites but common in C2, C3, and UOC meteorites, suggesting that this component was not incorporated into micrometeorites. Likewise, olivines with high Al and Ca are not present in these micrometeorites, indicating an absence of the refractory enriched olivines found in C2, C3, and UOC meteorites. Olivine high in both Mn and Mg is not present in these micrometeorites but is present in C1 meteorites and interplanetary dust. The individual chemical features of olivines from the primitive samples indicate that each sample type has incorporated a particular compositional type of olivine rather than sampling a homogeneous olivine reservoir. (Auth.)

E-46641

Colhoun, E.A., Mabin, M.C.G., Adamson, D.A., Kirk, R.M., **Antarctic ice volume and contribution to sea-level fall at 20,000 yr bp from raised beaches,** *Nature,* July 23, 1992 358(6384), p.316-319, 37 refs.

The contribution of the antarctic ice sheets to global sea-level fall at the Last Glacial Maximum (LGM) depends largely on how the extent and thickness of peripheral ice changed. Model studies suggest that there was widespread thickening of the ice-sheet margins, sufficient to induce a drop in sea level of at least 25 m. Geological evidence, on the other hand, indicates only limited ice expansion and a sea-level fall of just 8 m. Here recent data are used on the altitudes and ages of raised beaches from the Ross embayment and East Antarctica to investigate the timing and extent of antarctic deglaciation. These indicate that the ice margin during the LGM was thinner and less extensive than has been formerly thought, and that its contribution to the drop in sea level was only 0.5-2.5 m. Deglaciation was well advanced by 10 kyr BP and was complete by 6 kyr BP. These findings imply either that sea level during the LGM fell less than present estimates suggest, or that an ice volume considerably greater than currently accepted must have been present in the Northern Hemisphere. (Auth.)

E-46669

Cooper, A.K., **Cenozoic prograding sequences of the antarctic continental margin: a record of glacio-eustatic and tectonic events,** *Marine geology,* Dec. 1991 102(1/4), Evolution of Mesozoic and Cenozoic Continental Margins. 1990 SEPM Research Symposium, Proceedings. Edited by A.W. Meyer, T.A. Davies, and S.W. Wise, p.175-213, Refs. p.209-213.

Sedimentary sections up to 6-14 km thick lie beneath many areas of the antarctic continental margin. The upper parts of the sections contain up to 6 km of Cenozoic glacial and possibly non-glacial sequences that have prograded the continental shelf up to 85 km. Cenozoic sequences are described using two general categories based on their acoustic geometries. Type IA sequences, which account for most prograding of the antarctic continental shelf, have complex sigmoidal geometries and some acoustic characteristics atypical of low-latitude margins, such as troughs and mounds lying parallel and normal to the shelf edge, and high velocities (2.0-2.6 km/s) for flat layers within 150 m of the seafloor. Type IIA sequences, which principally aggrade the paleoshelf, lie beneath type IA sequences and have mostly simple geometries and gently dipping reflections. The prograding sequences are commonly located near the seaward edges of major Mesozoic and older margin structures. Relatively rapid Cenozoic subsidence has occurred due to the probable rifting in the Ross Sea, thermal subsidence in the Antarctic Peninsula, and isostatic crustal flexure in Wilkes Land. In Prydz Bay and the Weddell Sea, prograding sequences cover Mesozoic basins that have undergone little apparent Cenozoic tectonism. This analysis is preliminary. Further acoustic surveys and scientific drilling are needed to resolve the proximal antarctic record of glacio-eustatic, climatic, and tectonic events recorded by the prograding sequences. (Auth. mod.)

E-46670

Robert, C., Kennett, J.P., **Paleocene and Eocene kaolinite distribution in the South Atlantic and southern ocean: antarctic climatic and paleoceanographic implications,** *Marine geology,* Jan. 1992 103(1/3), p.99-110, 42 refs.

Clay mineral associations of Paleocene and Eocene age have been examined in six drilled sequences from the southern South Atlantic and southern ocean. These sites are located to provide three depth transects across intermediate water masses. Kaolinite was not observed in the latest Cretaceous (Maastrichtian) sediments of Maud Rise. Kaolinite first appears in the clay mineralogical assemblages in the earliest Paleocene (about 65 to 64.5 Ma) at a time of relatively cool intermediate waters and before a warming trend of surface waters. Currents at intermediate water depths transported fine terrigenous sediments from the antarctic continent northwards into the southern ocean. Kaolinitic soils are inferred to have developed strongly in East Antarctica during the latest Paleocene and early Eocene (about 59 to 52 Ma) at a time when the oxygen isotopic data indicate maximum warmth of surface and intermediate waters of the southern ocean. These are interpreted to reflect a Paleocene maximum of antarctic rainfall. This development peaked at 57.3 Ma, close to the Paleocene-Eocene boundary, a time of maximum warmth, based on oxygen isotopic data. Increased illite content (and associated chlorite and random mixed-layer clays) at the end of the middle Eocene (about 41 Ma) suggest local development of poorly weathered soils on Antarctica, favored by a cooling of the southern ocean. Coeval extension of kaolinite into shallower water depths, and similar clay mineral associations in shallower and deeper sites, indicate that the development of cooler conditions led to an increasing influence of antarctic environments upon intermediate water masses at high latitudes. (Auth. mod.)

E-46676

Antoine, L.A.G., Moyes, A.B., **Geophysical evidence for a causative process for fragmentation in western Gondwana,** *Geology,* July 1992 20(7), p.605-608, 38 refs.

The existence and subsequent fragmentation of the Gondwana supercontinent are well established in the geological literature. Debate continues, however, on the exact prefragmentation geometry and the causative process of breakup. The eastern Walvis Ridge and the Agulhas and Mozambique plateaus, which surround southern Africa, exhibit geophysically anomalous oceanic crust and lithosphere. In the vicinity of these aseismic bathymetry highs, the crust is considerably thicker than normal, and the uppermost mantle has lower than normal densities and seismic velocities. Within a Gondwana framework, these anomalies coincide with a highly fragmented region at the triple junction of the three major plates (Africa, South America, and Antarctica). This anomalous oceanic crust and lithosphere, the ubiquitous and contemporaneous magmatism, and the basin and range-type tectonism of the region are consonant with a hot-mantle-upflow tectonic framework as the causative process for fragmentation. (Auth.)

E-46677

Dalla Salda, L., Cingolani, C., Varela, R., **Early Paleozoic orogenic belt of the Andes in southwestern South America: Result of Laurentia-Gondwana collision?,** *Geology,* July 1992 20(7), p.617-620, 20 refs.

The late Precambrian to early Paleozoic age rock units of the Pampean ranges, the Puna, and the North Patagonian massif of southwestern South America constitute the Famatinian orogenic belt. They are interpreted as an Ordovician collisional belt between the Occidentalia terrane and the Gondwana craton. They include mafic and ultramafic belts of Neoproterozoic to early Paleozoic age. An intense tectonothermal event resulted from the collision; syntectonic granitoids represent crustal melting. In that collision, syntectonic to late-tectonic foreland basins developed. The recently proposed juxtaposition of Laurentia and East Antarctica-Australia in the Neoproterozoic raises the possibility that Laurentia and western South America were close together in the early Paleozoic, and therefore that the Famatinian belt resulted from Laurentia-Gondwana collision. Occidentalia, which is bordered by a Cambrian carbonate platform similar to that of eastern North America, may be a sliver detached from Laurentia during Late Ordovician time. (Auth.)

E-46678

Elliot, C.G., Gray, D.R., **Correlations between Tasmania and the Tasman-Transantarctic orogen: evidence for easterly derivation of Tasmania relative to mainland Australia,** *Geology,* July 1992 20(7), p.621-624, 33 refs.

Reconstructions of southern Gondwana place Tasmania at the triple junction of Paleozoic Australia, Antarctica, and New Zealand. Tasmania, however, differs in pre-Jurassic stratigraphy and structural style from the southeastern Australia mainland and northeast Victoria Land. Most notably, (1) Precambrian basement is exposed in Tasmania but not in the Lachlan fold belt of the Australian mainland. Precambrian basement in northeast Victoria Land and the Adelaide-Kanmantoo fold belt of southeast Australia differ in stratigraphy and metamorphic history from that in Tasmania; and (2) western Tasmania is dominated by east-verging Cambrian and Devonian thrusts, whereas the Lachlan fold belt is dominated by west-verging Ordovician thrusts, and northeast Victoria Land is dominated by east-verging Ordovician thrusts. An explanation for the misfit between Tasmania and the other regions is that ancestral Tasmania was positioned east of mainland Australia with possible Precambrian links to North America (SWEAT hypothesis), and was progressively emplaced by a combination of west-directed Cambrian and Devonian thrusting, Cretaceous crustal stretching to form the Gisspland and Bass basins, and finally Tertiary wrenching south of the Gambier-Gabo line. (Auth.)

E-46687
Shooter, D., **Chromatographic analysis of reduced sulfur gases in antarctic waters following pre-concentration onto Tenax,** *International journal of environmental analytical chemistry,* 1992 47(4), p.239-249, 22 refs.

A technique was developed using sparging and pre-concentration onto a Tenax trap at ambient temperature, allowing field measurements to be made of reduced sulfur gases in antarctic marine and glacial melt waters. Following thermal desorption, gases were determined by gas chromatography using a flame photometric detector. Detection limits in ng/l were: H2S 50, OCS 8, SO2 160, CH3SH 6, CH3SCH3 20 and CS2 2. Storage of melt water samples for more than 24 hours resulted in concentration changes of the reduced sulfur gases present. While the antarctic environment imposed limitations on the analytical method, an investigation of various pond and marine waters was undertaken. (Auth. mod.)

E-46699
Schuller, P., Lovengreen, C., Vega, M., **Cs-137 concentrations in soil profiles from Admiralty Bay and Canto Point** [Concentración de Cesio-137 en dos perfiles de suelo en el área de Bahías Almirantazgo y Chile], *Acta antártica ecuatoriana,* 1990 Vol.1, p.73-78, In Spanish with English summary. 5 refs.

During the Second Ecuadorian Expedition to Antarctica, involved in a project of evaluation of radionucleides on South Shetland Is., two soil profiles were obtained. The one corresponding to Admiralty Bay shows a surface Cs-137 activity considerably higher than predicted at that latitude, suggesting that the penetration of the isotope is favored by the edaphic properties and geomorphology of the area. The other, corresponding to Canto Point, presents a relatively minor surface Cs-137 activity. (Auth. mod.)

E-46716
Smith, A.G., Livermore, R.A., **Pangea in Permian to Jurassic time,** *Tectonophysics,* 1991 Vol.187, p.135-179, Refs. p.176-179.

The apparent polar wander paths (APWPs) for the northern and southern continents have been redetermined using revised time-scales and data. When plotted on the conventional Pangea, Pangea A, the paths are distinct but essentially linear and parallel from Late Carboniferous to Late Permian time. Both paths then undergo a sharp change in direction and converge so as to overlap in Early to Middle Jurassic time. If the Permo-Triassic magnetic field was an axial dipole, then paleomagnetic data show that Pangea was mobile during most, and possibly all, of the mid-Triassic to mid-Jurassic interval. Because of the uncertainties in pole ages and positions, and errors in measurements, the new APWPs are consistent with a range of Pangeas. (Auth. mod.)

E-46722
Pirrie, D., **Controls on the petrographic evolution of an active margin sedimentary sequence: the Larsen Basin, Antarctica,** Developments in sedimentary provenance studies, edited by A.C. Morton, S.P. Todd and P.D.W. Haughton, Geological Society Special Publication No.57 , London, The Geological Society, 1991, p.231-249, Refs. p.247-249.

The sedimentary fill of the Cretaceous-Tertiary Larsen Basin, located at the northern tip of the Antarctic Peninsula, records the evolution of the Antarctic Peninsula source terrain. Uplift, and the possible renewal of arc volcanism within this area, is documented by the wide petrographic spread in the lower Gustav Group (Barremian-Coniacian). The Hidden Lake Formation (Coniacian-Santonian) records a major pulse in proximal calc-alkaline arc volcanism. The overlying Marambio Group shows a change from lithic-volcanic sandstones to quartz-feldspar-rich sandstones, reflecting a change in source terrain. An abrupt change in sandstone composition in the upper Santa Marta Formation (Campanian) may reflect both a switch in volcanism and plutonism from the east to the west coast of the Antarctic Peninsula (i.e. away from the basin margin), and a change to more mafic volcanism. The Lopez de Bertodano Formation (Campanian-Palaeocene) dominantly reflects a change to a quartzo-feldspathic source terrain (the Trinity Peninsula Group). This is also related to both a decrease in the intensity of arc volcanism and an increase in distance from the location of concurrent volcanism in relation to the site of deposition. Controls on petrography other than simple arc-unroofing (e.g. location and nature of arc volcanism and depositional setting) play an important role in sandstone petrography. These controls on sandstone composition should always be considered in interpreting sequences from active plate margin settings. (Auth.)

E-46723
Doyle, P., Whitham, A.G., **Palaeoenvironments of the Nordenskjöld Formation: an antarctic Late Jurassic—Early Cretaceous black shale-tuff sequence,** Modern and ancient continental shelf anoxia, edited by R.V. Tyson and T.H. Pearson, Geological Society Special Publication No.58, London, The Geological Society, 1991, p.397-414, Refs. p.412-414.

This study documents the palaeoenvironments of a Jurassic-Cretaceous boundary black shale-tuff sequence exposed on the east coast of the Antarctic Peninsula. Sedimentological and palaeontological indices show that during the deposition of the lower part of the succession, bottom waters were predominantly anaerobic with brief spells of exaerobic or 'episodically dysaerobic' conditions. During the deposition of the upper part of the succession, dysaerobic conditions prevailed with mean levels of dissolved oxygen increasing through time. The upward changes seen in the Nordenskjöld Formation are thought to be related to tectonic uplift of the sea floor, through a pycnocline. (Auth.)

E-46728
Harden, S.L., DeMaster, D.J., Nittrouer, C.A., **Developing sediment geochronologies for high-latitude continental shelf deposits: a radiochemical approach,** *Marine geology,* Jan. 1992 103(1/3), p.69-97, 72 refs.

During Jan. and Feb. of 1986, 47 box cores and 55 piston cores were collected from the Bransfield Strait, Gerlache Strait and Marguerite Bay. Apparent sediment accumulation rates established for 100-yr time scales with excess Pb-210 chronologies range from 0.08 to 0.34 cm/yr in the Bransfield Strait, 0.15 to 0.51 cm/yr in Gerlache Strait and from 0.10 to 0.27 cm/yr in Marguerite Bay. On a 1000-yr time scale C-14 measurements of five piston cores from the Bransfield Strait yielded sediment accumulation rates ranging from 0.06 to 0.49 cm/yr. Sediment accumulation rates for the Gerlache Strait and for Marguerite Bay are significantly lower than the observed apparent Pb-210 accumulation rates for this region. A one-dimensional advection-diffusion model, solved simultaneously with Pb-210 and C-14 data for BC18 and BC113, indicates that Pb-210 and C-14 sediment accumulation rates agree within a factor of 2 in the Bransfield Strait, whereas in Marguerite Bay the apparent Pb-210 accumulation rates may be as much as an order of magnitude too high. In the region of the Antarctic Peninsula, radiocarbon measurements in the seabed are a better approach than Pb-210 for establishing accurate rates of sediment accumulation. The C-14 chronologies, when coupled with Pb-210 data, provide more reliable assessments of biological deep mixing and sediment accumulation rates than do excess Pb-210 data coupled with measurements of bomb-produced Cs-137. Seabed measurements of Pb-210, Cs-137 and C-14 also provided valuable insights on water circulation and upwelling, atmospheric inputs and sediment depositional processes for the Antarctic Peninsula region.

E-46738
Semenov, V.S., Vapnik, E.A., **High-pressure complex of the Shackleton Range, Antarctica,** *Polar geography and geology,* Jan-Mar. 1992 16(1), p.72-85, 31 refs.

The study comprises an investigation of the Shackleton Range (which is a part of the East Antarctic craton) by two geologists affiliated with the Russian Academy of Sciences in St. Petersburg. It is focused on thermodynamic conditions of metamorphism and includes an analysis of fluid characteristics based on the cryometric method. The detected presence of slightly mineralized salt-water inclusions in quartz provided new evidence suggesting a crustal nature of the fluid and an isochemical nature of the metamorphism.

E-46744
Iwata, S., **Report on the geomorphological, geological, geodetic, and glaciological fieldwork in the Sör Rondane Mountains, 1990/91 summer (JARE-32),** *Antarctic record,* Nov. 1991 35(3), p.355-401, In Japanese with English summary. 15 refs.

The Sör Rondane field party (JARE-32) carried out its research in the central area of the Sör Rondane Mountains, from Dec. 24, 1990 to Feb. 7, 1991. The field trip consisted of 2 parties traveling from mountain to mountain to shift tented camps using 4 snow vehicles towing their equipment. Nine snowmobiles (motor toboggans) were used for field research on glaciers. Geomorphologists carried out measurements in the periglacial field experimental sites, observations of rock weathering, and mapping of chronological sequence of tills and moraines. Geologists studied chronological sequence of rock formation and collected rock specimens for structural, petrological, and chemical analyses. A surveyor set up geodetic control stations using the GPS satellite positioning system, and made gravity surveys on glaciers as well as at some control stations. Two Belgian glaciologists took part in the fieldwork as exchange scientists and studied the dynamics of glacier movement and ice thickness. (Auth. mod.)

E-46748
Moriwaki, K., Hirakawa, K., **Glacial landforms and Late Cenozoic history of the western Sör Rondane Mountains,** *Antarctic record,* Mar. 1992 36(1), p.15-48, In Japanese with English summary. Refs. p.38-39.

The western Sör Rondane Mountains, with the exception of several high peaks, were once covered by ice. The mountains are in some places covered with tills weathered in various degrees. Heavily weathered ground including Pliocene till is found on flat- topped surfaces of the mountains and glacial benches about 100 m higher than the present ice surface. Heavily weathered ground is found also in an ice-free valley, the bottom of which is lower than the surrounding ice surface. Tills of the early to middle Pleistocene are small in quantity, and form only small lateral moraines on the mountain flanks about 100 m higher than the present ice surface. Since the late Pleistocene, supraglacial tills have formed moraine fields around the mountains less than 10 m above the present ice surface. The Pliocene temperate ice sheet produced, transported and deposited a large quantity of tills, and eroded the valley systems dividing the mountains into several blocks. The ice sheet shrank and most of the mountains emerged from ice by the latest Pliocene. The lowest level of the ice sheet during this deglaciation was probably lower than that of the present day. (Auth. mod.)

E-46765
Gopala Rao, D., Chaubey, A.K., Ramprasad, T., **Cretaceous-Tertiary sea floor off Dronning Maud Land, Antarctica,** *Tectonophysics,* May 15, 1992 205(4), p.447-452, 21 refs.

A study of the bathymetric and linear magnetic anomalies between Dronning Maud Land and the South West Indian Ridge (SWIR) revealed a Mesozoic sequence of linear magnetic anomalies, M0 to M12 (108-126 Ma), a fracture zone offset (about 130 km), and the Cretaceous magnetic quiet zone between isochrons M0 (108 Ma) and 34 (80 Ma). The study sheds light on: (1) the evolution of an anomalous "stretched" pattern of seafloor anomalies during magnetic isochrons M0 and 34, and the associated offset (>10 deg) in some segments of the northeastern part of the SWIR; and (2) continuation of a proposed buried fracture zone to the south, where it abuts the Astrid Ridge off Dronning Maud Land. The history of spreading is related to declining dynamic pressures at the plate margin, due to the Kerguelen-Heard mantle plume during Cretaceous time (about 110 Ma). (Auth.)

E-46769
Allibone, A.H., Norris, R.J., **Segregation of leucogranite microplutons during syn-anatectic deformation: an example from the Taylor Valley, Antarctica,** *Journal of metamorphic geology,* July 1992 10(4), p.589-600, 51 refs.

A suite of migmatites in uppermost amphibolite facies schists of the Koettlitz Group exposed in the Taylor Valley provides direct evidence of the behavior of partially molten rock during syn-anatectic deformation. The geometry of the migmatites is directly related to their position relative to the hinge of a kilometer-scale antiform. Migmatitic rocks on the fold limbs are characterized by extensional shears and fractures, filled with leucosome material, that intersect the pervasive foliation and millimeter-thick stromatic leucosomes. Vein- and dyke-like leucosomes become more common and thicker from the limb to the hinge region of the antiform. Rocks characterized by high leucosome-to-rock ratios near the antiform hinge are xenolithic in appearance. Major parasitic folds within the hinge contain leucogranite 'microplutons' up to 50 m across beneath refractory 'cap-rock' layers. Angular boudinage structures in schists surrounded by leucosomes indicate a relatively low yield strength in the leucosome, which is compatible with a molten rather than solid leucosome. Leucogranite-bearing extensional shears and fractures indicate that repeated extensional fracturing and shearing promoted by high fluid (melt) pressure is an important mechanism of melt segregation. Dilation in the hinges of developing folds aids the migration of melt into fold hinges and the development of 10-50 m-wide 'microplutons' of xenolith-rich leucogranite. Lack of vapor-absent melting and consequent low melt-to-rock ratios allowed the Koettlitz Group to maintain its structural coherency on a kilometer scale. Consequently, leucosome 'microplutons' did not exceed 50 m in width, and therefore observed leucosomes have not contributed to the development of adjacent plutonic-scale granitoids. (Auth.)

E-46798
Matsuoka, N., **Model of the rate of frost shattering: application to field data from Japan, Svalbard and Antarctica,** *Permafrost and periglacial processes,* Oct.-Dec. 1991 2(4), Workshop on Mechanical Weathering, Caen, France, Apr. 29-May 2, 1991. Proceedings, p.271-281, With French summary. 26 refs.

An empirical model of the rate of bedrock frost shattering was applied to field data obtained from four different environments: Japanese lowland and alpine regions, Svalbard, and Antarctica. The model indicates that the annual frost shattering rate is a function of freeze-thaw frequency per year, degree of saturation and bedrock tensile strength. Field measurements of these parameters were carried out for 1-6 years on rockwalls in the four study areas. Despite the differences in thermal and moisture conditions, the model agreed fairly well with field data, with the exception of those from Antarctica and part of Svalbard, where moisture is insufficient for frost shattering. The model predicts the weathering rates of bedrock situated in environments where frost shattering prevails. (Auth.)

E-46806

Dalziel, I.W.D., Grunow, A.M., **Late Gondwanide tectonic rotations within Gondwanaland,** *Tectonics,* June 1992 11(3), p.603-606, 43 refs.

Geologic and paleomagnetic evidence from the Ellsworth-Whitmore mountains crustal block of West Antarctica, and from the Falkland Is., indicates that tectonic displacement of major portions of the "Samfrau geosyncline" occurred after the early Mesozoic Gondwanide folding but prior to seafloor spreading. Comparison with continental deformation in the collisional Alpine-Himalayan belt offers a mechanism for the displacements while supporting the hypothesis that the Gondwanian orogeny resulted from collision of a fore-arc and magmatic arc terrane with the Panthalassic margin of the Gondwana craton during closure of a marginal basin. The displacements had major consequences for the ensuing evolution of the South Atlantic-Weddell Sea-Ross Sea region. (Auth.)

E-46807

Fitzgerald, P.G., **Transantarctic Mountains of southern Victoria Land: the application of apatite fission track analysis to a rift shoulder uplift,** *Tectonics,* June 1992 11(3), p.634-662, Refs. p.660-662.

A fission track study of the Transantarctic Mountains (TAM) in the Granite Harbour and Wilson Piedmont Glacier areas of southern Victoria Land reveals information on the timing of uplift, the amount of uplift and erosion, and the structure of the mountains, especially the onshore Transantarctic Mountains Front (TAM Front), which represents the boundary between East and West Antarctica. Details of these characteristics as well as those of ages, drainage, and height changes are provided. (Auth. mod.)

E-46808

Wood, R.A., Evans, K.R., Zhuravlev, A.IU., **New post-early Cambrian archaeocyath from Antarctica,** *Geological magazine,* July 1992 129(4), p.491-495, 21 refs.

A new species of archaeocyath sponge, *Dictyocyathus neptunensis,* is described from the lower third of the Nelson Limestone of the Neptune Range. Based on the presence of the trilobites *Nelsonia schesis* and *Amphoton oatesi,* these strata are interpreted to be mid- to late middle Cambrian in age. *D. neptunensis* shows a branching, low integration modular form and a very simple skeletal type. Such an organization is predicted from known morphological trends within the early Cambrian Archaeocyatha. Specimens are not in life position, and probably form part of a storm deposit. The absence of *Dictyocyathus* from latest early Cambrian (Toyonian) strata worldwide suggests a convergent nature for this highly simplified skeletal type in archaeocyaths. (Auth.)

E-46811

Ehrmann, W.U., Mackensen, A., **Sedimentological evidence for the formation of an east antarctic ice sheet in Eocene/Oligocene time,** *Palaeogeography, palaeoclimatology, palaeoecology,* May 1992 93(1/2), p.85-112, Refs. p.109-112.

Middle Eocene to late Oligocene sediments recovered at Ocean Drilling Program Sites 689 and 690 on Maud Rise in the southernmost Atlantic Ocean and at Sites 738 and 744 on Kerguelen Plateau in the southernmost Indian Ocean were analyzed in order to study the depositional environment and the palaeoclimate. Special emphasis was placed on the reconstruction of the formation of a cryosphere on the antarctic continent. The investigations include quantifications of carbonate and opal contents, grain size analyses and studies of clay mineral assemblages. The sediment parameters imply that East Antarctica was more or less totally buried beneath the ice during Oligocene time. The ice sheet, however, probably did not have a polar but a temperate character, as indicated by the occurrence of *Nothofagus* and relatively warm surface water temperatures prohibiting the long-distance transport of debris by icebergs. (Auth. mod.)

E-46850

Zhu, C., Cui, Z.J., Xiong, H.G., **Characteristics of the active layers on Fildes Peninsula of King George Island, Antarctica,** *Antarctic research,* Dec. 1991 2(2), p.24-37, 13 refs.

From the data of pitting, geoelectrical prospecting, temperature measurement, salt content analysis and detection by layering frost-heaving instruments, the structural features of sediments in the active layers of Fildes Peninsula are discussed. The presence of a bowl-shaped frost table in the stone-circles area is noted. Temperature distribution in the active layer, effects of salt content on electrical resistivity, thaw- settlement and frost-heaving, and their control on periglacial landform development are analyzed. It is suggested that 5 layers exist in the subsurface structure: the active layer, frost sand and gravel layer, frost volcanic rock permeated by sea water, frost volcanic rock unpermeated by sea water, and unfrosted ancient continental basement. Finally, the permafrost table and its vertical gradient are determined. (Auth. mod.)

E-46855

Ma, K.J., Li, Z.Z., Gao, S.T., **Mineralogical characteristics and control factors of surface sediments in the sea area northwest of the Antarctic Peninsula,** *Antarctic research,* Dec. 1991 2(2), p.75-82, 6 refs.

From analysis and study of clastic and clay minerals of surface sediments and their chemical composition in waters off the Antarctic Peninsula, 4 mineralogical provinces are proposed: the province of coast and island shelf of the South Shetland Is.; the province of eastern Bransfield Strait; the province of western Bransfield Strait; and the province of western Antarctic Peninsula. Relationships between the mineral distribution and its control factors, such as material source, volcanic activity, ice rafting and sea currents, are briefly discussed. (Auth. mod.)

E-46858

Fitzsimons, I.C.W., Thost, D.E., **Geological relationships in high-grade basement gneiss of the northern Prince Charles Mountains, East Antarctica,** *Australian journal of earth sciences,* May 1992 39(2), p.173-193, Refs. p.191-193.

High-grade gneiss in the northern Prince Charles Mountains has a complex intrusive and deformational history. Outcrop is dominated by homogeneous felsic orthogneiss, which encloses boudinaged mafic and ultramafic units. These boudins preserve structures (S1, F2) not seen in the host gneiss, and are interpreted as transposed and boudinaged dykes. Sedimentary protolith is inferred for less homogeneous felsic gneiss, interlayered with semi-pelite, calc-silicate and rare pelite. These basement lithologies were deformed into a series of flat-lying structures (S3, F4) consistent with progressive horizontal shear, and then into a series of upright structures (F5) culminating in the development of regional synforms, antiforms and monoclines (F6) separated by zones of intense upright fabric (S6). The D3 to D6 time interval was associated with several episodes of partial melting which produced discordant leucogneiss bodies, and with the emplacement of mafic dykes and charnockite plutons correlated with 950 to 1000 Ma charnockite elsewhere in East Antarctica. (Auth. mod.)

E-46859

Stüwe, K., Hand, M., **Geology and structure of Depot Peak, Mac. Robertson Land. More evidence for the continuous extent of the 1000 Ma event of East Antarctica,** *Australian journal of earth sciences,* May 1992 39(2), p.211-222, 18 refs.

The 1000 Ma event of East Antarctica is a granulite facies metamorphic event that affected rocks underlying more than 1000 km of the antarctic coastline between 50E and 70E. The limits of the belt are defined by isotopic dating, but attempts to define the belt on metamorphic grounds are sparse. Depot Peak provides an important link for determining the history of this belt as it is the only outcrop linking the Prince Charles Mountains to the Framnes Mountains and the western parts of the Rayner Complex. The rocks at Depot Peak are garnet and cordierite-bearing gneisses of low pressure granulite facies that were intruded by a large sheet of garnet granite prior to metamorphism and deformation. They experienced two deformation phases, D1 and D2, and they record two different metamorphic events around 560 MPa, 700 C (M1) and 510 MPa, 600 C (M2). This paper presents further evidence for the two dimensional extent of the belt, a feature that is difficult to reconcile with an interpretation based on a plate tectonic context. It is more likely that the metamorphic peak record for Depot Peak reflects a thermal buffering phase in the cooling history, rather than the absolute metamorphic peak. (Auth. mod.)

E-46860

Craw, D., Morrison, A.D., Walcott, C.R., **Fluid inclusion evidence for widespread shallow hydrothermal activity in South Victoria Land, Antarctica,** *New Zealand journal of geology and geophysics,* Mar. 1992 35(1), p.21-28, Refs. p.27-28.

Sparse but widespread veins cut Paleozoic basement, overlying Devonian-Triassic Beacon sediments and Jurassic Ferrar Dolerite in southern Victoria Land. The hydrothermal activity was mainly fracture controlled, and resulted in formation of well-defined steeply dipping veins. The fluids that produced these veins were variable in composition, ranging from very low salinity water, through low-moderate salinity CO2-bearing water, to CaCl2-NaCl-bearing brine. Mineral deposition occurred during fluid immiscibility or boiling in several veins. Temperatures of deposition range from 390 C down to 120 C. Fluid pressure was estimated for 4 samples, and these range between 0.4 and 40 MPa, corresponding to depths of between 40 and 4000 m. Several veins were deposited during decreasing temperature and possibly decreasing depth. At least some of the hydrothermal activity was related to high heat flow accompanying intrusion of the Jurassic Ferrar Dolerite. Other activity occurred progressively during uplift of the Royal Society Range during mid-late Cenozoic rifting in the Ross Sea region. (Auth.)

E-46861

Cox, S.C., **Garnet-biotite geothermometry of Koettlitz Group metasediments, Wright Valley, South Victoria Land, Antarctica,** *New Zealand journal of geology and geophysics,* Mar. 1992 35(1), p.29-40, Refs. p.39-40.

Garnet-biotite geothermometry is applied to three samples of Koettlitz Group metasediments from the Wright Valley: psammitic schist, pelitic schist, and melanosome. Spessartine-rich garnets were homogenized by volume diffusion during metamorphism. Petrographic and chemical constraints are used to select garnet-biotite pairs most likely to be in equilibrium. However, it is not conclusive as to which combination of either garnet core-far biotite pairs, or garnet rim-close biotite pairs, best represents peak metamorphic equilibria. Traditional geothermometry, involving the calculation of distribution coefficients and mean temperatures (+/- 2 standard deviations) for individual pairs using a 4.8 kbar pressure estimate, gives 864 +/- 82 C, 716 +/- 50 C, 680 +/- 33 C, 719 +/- 34 C, 722 +/- 156 C, 668 +/- 40 C, and 679 +/- 103 C using seven calibrations of the garnet-biotite geothermometer. There is no significant difference among mean temperatures calculated using garnet core-far biotite pairs and those using garnet rim-close biotite pairs, although core-far temperatures have smaller standard deviations. (Auth. mod.)

E-46862

Birkenmajer, K., Dudziak, J., **Calcareous nannoplankton spectra from Early Tertiary continental and marine tillites of King George Island (South Shetland Islands, Antarctica),** *Polish Academy of Sciences. Bulletin. Earth sciences,* 1990 38(1-4), p.1-15, 31 refs.

Coccolith spectra from continental and marine tillites of the Polonez Glaciation (Early Oligocene), and from marine tillites of the Kraków Glaciation (Eocene), indicate a considerable recycling of calcareous nannoflora. In the case of glacio-marine deposits, winter-ice and iceberg rafting, littoral and submarine reworking of older fossiliferous marine sediments may be an adequate explanation of the recycling. In the case of continental lodgement till, bulldozing of older marine sediments by ice-sheet advance over Bransfield Strait on its way from the antarctic continent to the South Shetland Is. seems a plausible explanation. (Auth.)

E-46863

Birkenmajer, K., Keller, A., **Pleistocene age of the Melville Peak volcano, King George Island, West Antarctica, by K-Ar dating,** *Polish Academy of Sciences. Bulletin. Earth sciences,* 1990 38(1-4), p.17-24, 19 refs.

Potassium-argon dating of basaltic lavas from the extinct Melville Peak volcano of King George I. indicated a Middle-Late Pleistocene age for the first phase of activity (296,000 +/- 27,000; 231,000 +/- 19,000; 72,000 +/- 15,000 years). (Auth.)

E-46864

Birkenmajer, K., Lydka, K., **Mineralogical evidence for warm Palaeogene climate from the Ezcurra Inlet Group, King George Island, West Antarctica,** *Polish Academy of Sciences. Bulletin. Earth sciences,* 1990 38(1-4), p.25-38, 13 refs.

The rocks of the Ezcurra Inlet Group (Paleogene) show the presence of intense but unequally distributed hydrothermal zeolitization which obliterates to some extent the original nature of terrestrial-type volcanics, volcaniclastics and sediments. The latter often preserved the original character of regoliths which contain, as a main component, smectite and kaolinite formed under intense subaerial weathering of single feldspars and volcanic rock-fragments in warm Paleogene climate. This supplies the evidence for warm climate in West Antarctica at the boundary of Eocene and Oligocene already derived from analysis of plant remnants and thin coal seams of the same succession. (Auth.)

E-46865

Birkenmajer, K., **Tertiary basaltic hyaloclastites on King George Island (South Shetland Islands, Antarctica),** *Polish Academy of Sciences. Bulletin. Earth sciences,* 1990 38(1-4), p.111-122, 26 refs.

Tertiary basaltic hyaloclastites associated with lava flows and glacio-marine sediments occur on King George I. at several localities. Two good examples, from Magda Nunatak and from Chopin Ridge, are described. At both sites alternating basaltic lavas and hyaloclastites occur together with shallow-marine deposits of Eocene and Oligocene ages, respectively. (Auth.)

E-46877

Pirrie, D., Duane, A.M., Riding, J.B., **Jurassic-Tertiary stratigraphy and palynology of the James Ross Basin: review and introduction,** *Antarctic science,* Sep. 1992 4(3), p.259-266, Refs. p.264-266.

A sedimentary sequence, *c.* 5-6 km thick, extending from the Kimmeridgian-Upper Eocene, crops out in the James Ross I. area.

This succession is the most important onshore Late Cretaceous-Tertiary sequence in Antarctica, and is probably one of the most significant Cretaceous sequences in the Southern Hemisphere. However, the understanding of the geological and palaeontological evolution of the area has been limited by an incomplete knowledge of the biostratigraphy of this region. Palynological studies are providing a finer resolution biostratigraphical zonation scheme than previously possible. This paper reviews the stratigraphy of the basin fill succession and provides a framework for the papers published in this Special Issue. (Auth.)

E-46878
Snape, M.G., **Dinoflagellate cysts from an allochthonous block of Nordenskjöld Formation (Upper Jurassic), northwest James Ross Island,** *Antarctic science,* Sep. 1992 4(3), p.267-278, 19 refs.

An allochthonous block of the Nordenskjöld Formation from northwest James Ross I. has yielded a diverse marine palynoflora. Dinoflagellate cyst assemblages from the 185 m thick sequence are described and compared with similar microfloras previously described from Australia; Papua, New Guinea, and Madagascar. A mid Tithonian (Late Jurassic) age is suggested for the section. One new genus, *Helbydinium* gen. nov. and four new species, *Helbydinium scabratum* sp. nov., *Leptodinium acneum* sp. nov., *Leptodinium posterosulcatum* sp. nov. and *Rhynchodiniopsis foveata* sp. nov. are described. (Auth.)

E-46879
Keating, J.M., Spencer-Jones, M., Newham, S., **Stratigraphical palynology of the Kotick Point and Whisky Bay formations, Gustav Group (Cretaceous), James Ross Island,** *Antarctic science,* Sep. 1992 4(3), p.279-292, 32 refs.

Palynomorph assemblages are reported from the Kotick Point and Whisky Bay formations in west and northwest James Ross I. The microfloras, particularly the dinoflagellate cyst florules, indicate an Aptian to early/mid Albian age for the Kotick Point Formation and a mid Albian to Turonian age for the Whisky Bay Formation, on the basis of comparison with records from other Southern Hemisphere localities. The ages adduced broadly corroborate those previously derived from macrofaunas. The dinoflagellate cyst floras are closely comparable with those previously reported from Australasia to the extent that recognition of certain microplankton zones is possible. The miospore flora is largely composed of long ranging taxa of limited age diagnostic value. The palynoflora comprises 77 dinoflagellate cyst, 52 miospore and 7 acritarch, chlorophyte and prasinophyte taxa. (Auth.)

E-46880
Keating, J.M., **Palynology of the Lachman Crags Member, Santa Marta Formation (Upper Cretaceous) of north-west James Ross Island,** *Antarctic science,* Sep. 1992 4(3), p.293-304, Refs. p.301-302.

Palynomorph assemblages from the Lachman Crags Member of the Santa Marta Formation, northwest James Ross I. are described. From comparison with other Southern Hemisphere localities, particularly southern Australia, an early Santonian-early Campanian age is indicated. The results broadly corroborate previous stratigraphical interpretations based on macrofaunal evidence, although the presence of a significant thickness of Santonian strata, not previously recognized, is suggested. The dinoflagellate cyst floras allow the recognition of the local equivalents of the Australian *Odontochitina porifera, Isabelidinium cretaceum, Nelsoniella aceras* and *Xenikoon australis* Interval Zones. Some recycling of mid Cretaceous (and possibly Late Jurassic) taxa is also indicated. The miospore flora is composed of relatively long-ranging species, although the local appearance of certain taxa may be of stratigraphical significance. Ranges recorded support previous interpretations of heterochroneity in Southern Hemisphere floras. The palynoflora comprises 76 dinoflagellate cyst, 40 miospore and 7 acritarch, prasinophyte and chlorophyte taxa. Six undescribed species of dinoflagellate cyst are recorded and placed in open nomenclature. (Auth.)

E-46881
Sumner, P.W., **Dinoflagellate cysts from the Rabot Member (Santa Marta Formation) of eastern James Ross Island,** *Antarctic science,* Sep. 1992 4(3), p.305-310, 21 refs.

Palynomorph assemblages dominated by dinoflagellate cysts are described from seventeen samples from the Rabot Member of the Santa Marta Formation at Ekelöf Point, eastern James Ross I. Although the assemblages are of relatively low diversity, the dinoflagellate cyst taxa recorded indicate a mid to late Campanian (Late Cretaceous) age. Changes in species diversity, dominance and gonyaulacacean ratio suggest a gradually reducing distance from shore during deposition, with a return to more offshore conditions towards the section top. A new species of dinoflagellate cyst, *Isabelidinium papillum,* is described. (Auth.)

E-46882
Dolding, P.J.D., **Palynology of the Marambio Group (Upper Cretaceous) of northern Humps Island,** *Antarctic science,* Sep. 1992 4(3), p.311-326, 31 refs.

Palynological analyses of the Marambio Group sediments of Humps I. (Santa Marta and López de Bertodano formations) indicate that there is minor displacement across a prominent NW-SE trending normal fault which passes beneath the southern bluff. No major compositional differences were perceived between the palynomorph assemblages either side of the fault. A late Campanian age is suggested for both sequences, based on comparison with Australasian dinoflagellate cyst zonations. A new species of the dinoflagellate cyst *Bourkidinium* has been recorded from strata on either side of the fault. A significant number of recycled Permian and Early Cretaceous palynomorphs were recorded. Most are miospores and exhibit significant variation in preservational states, implying derivation from several sources. More thermally mature Permian gymnosperm pollen is most likely derived from the nearby Trinity Peninsula Group, exposed on the Antarctic Peninsula. The source of the relatively well preserved Permian pollen is problematic. (Auth.)

E-46883
Wood, S.E., Askin, R.A., **Dinoflagellate cysts from the Marambio Group (Upper Cretaceous) of Humps Island,** *Antarctic science,* Sep. 1992 4(3), 327-336, Refs. p.334-335.

Thirty samples from two sections on southwestern Humps I., James Ross Basin, northern Antarctic Peninsula, contain moderately diverse dinoflagellate cyst assemblages deposited in shallow shelf, open marine conditions. Assemblages contain common *Isabelidinium* spp., including *I. cretaceum* and *I. pellucidum, Cerodinium diebelii,* common *Odontochitina* spp., including *O. operculata, O. porifera* and *O. spinosa,* plus *Nelsoniella* cf. *aceras, Octodinium askiniae* and rare *Chatangiella tripartita, C. victoriensis, Isabelidinium* cf. *belfastense* and *I. korojonense.* This association includes species with Santonian and Campanian (to Maastrichtian) distribution in Australia and New Zealand. Some of these species may be recycled. A Campanian age is suggested for the Humps I. sections. (Auth.)

E-46884
Smith, S.W., **Microplankton from the Cape Lamb Member, López de Bertodano Formation (Upper Cretaceous), Cape Lamb, Vega Island,** *Antarctic science,* Sep. 1992 4(3), p.337-353, Refs. p.351-352.

Samples from the lower Cape Lamb Member, López de Bertodano Formation, Cape Lamb, Vega I., Antarctic Peninsula have yielded rich and diverse marine palynofloral assemblages. The overall character of the palynofloral assemblages indicate a latest Campanian-earliest Maastrichtian age. Four new dinoflagellate cyst species *Canninginopsis ordospinosa* sp. nov., *Microdinium?gymnosuturum* sp. nov., *Phelodinium exilicornutum* sp. nov. and *Operculodinium radiculatum* sp. nov., *Manumiella* n.sp. 3 and *Isabelidinium cretaceum* allow a correlation of the lower Cape Lamb Member with the upper palynomorph zone 1/lower zone 2 on nearby Seymour I. (Auth.)

E-46885
Cocozza, C.D., Clarke, C.M., **Eocene microplankton from La Meseta Formation, northern Seymour Island,** *Antarctic science,* Sep. 1992 4(3), p.355-362, 25 refs.

Twenty-two samples collected from the Tertiary La Meseta Formation of Cape Wiman yielded abundant and moderately diverse assemblages of marine palynoflora, dominated by dinoflagellate cysts, together with acritarchs and chlorophyta. The assemblages can be divided into three associations: Association 1, characterized by low diversity dinoflagellate assemblage of late Early Eocene age which are dominated by *Enigmadinium cylindrifloriferum;* Association 2 characterized by more diverse dinoflagellate cyst assemblages, which show a marked decrease in the dominance of *E. cylindrifloriferum,* and an increase in relative abundance of *Areosphaeridium* cf. *diktyoplokus;* and Association 3 which is characterized by a decrease in dinoflagellate cyst diversity up section. Changes in dinoflagellate cyst dominance and diversity throughout the section suggests a gradation from a stressed, shallow marine palaeoenvironment to a more open nearshore, shallow marine system becoming progressively more nearshore up section. The assemblages are no older than late Early Eocene in age, and possibly as young as Mid-Late Eocene. (Auth.)

E-46888
Mashiotta, T.A., **Biogenic sedimentation in Andvord Bay, Antarctica: a 3,000 year record of paleoproductivity,** Clinton, Hamilton College, 1992, 86p., B.A. thesis. Refs. p.83-86.

Biogenic silica analyses were conducted on samples from a piston core (No.22) collected in Andvord Bay to examine the relationship between paleoclimate and primary productivity, and to predict the effects of global warming on productivity within the fjord environment. Forty-six samples were collected from the 900 cm core and analyzed for bulk density and biogenic silica. The biogenic silica flux in Andvord Bay ranges between 166 and 762 g/sq m/yr, and the carbon flux between 11 and 57 g/sq m/yr. It is believed that these high flux rates, which may result from the unique isolated morphology of Andvord Bay, are indicative of high rates of primary productivity within antarctic subpolar fjords. Maximum rates of productivity are assumed to have occurred during a warmer climate, when the sea ice cover was less extensive spatially and temporally, and receipt of solar radiation by the surface water column was greater. Based on the changes in weight percent biogenic silica and total organic carbon between 133 and 3,115 years B.P., it appears that a 2 C increase in global temperatures over roughly a 150 year period caused an increase in productivity of only 4%. (Auth. mod.)

E-46902
Robot mission in Antarctica, *Geotimes,* June 1992 37(6), p.7-8.

This note describes a mobile robot under development for deployment in a geological survey of the interior of volcanic Mt. Erebus. The robot, designated the Erebus Explorer, consists of two complementary vehicles, a wheeled transporter and a walking, spider-legged rappeller, which in tandem will navigate the exterior of Erebus, descend into the volcano crater and perform various geological experiments, including the sampling of fresh lava. Once the crater survey is completed, the rappeller will return via umbilical attachment to the transporter and be carried atop the transporter back to base camp.

E-46905
Kyle, P.R., Moore, J.A., Thirlwall, M.F., **Petrologic evolution of anorthoclase phonolite lavas at Mount Erebus, Ross Island, Antarctica,** *Journal of petrology,* Aug. 1992 33(4), p.849-875, Refs. p.873-875.

Mount Erebus is an active, intraplate, alkaline volcano. The strongly undersaturated sodic lavas range from basanite to anorthoclase phonolite, and are termed the Erebus lineage (EL). The lavas are porphyritic with olivine, clinopyroxene, opaque oxides, feldspar, and apatite. Rare earth element (REE) contents increase only slightly with increasing differentiation compared with other incompatible elements. The light REE are enriched and there are no significant Eu anomalies. Sr-87/Sr-86 is uniform and low (about 0.7030) throughout the EL, suggesting derivation of the basanites from a depleted asthenospheric mantle source, and lack of significant crustal contamination during fractionation of the basanite. Regular geochemical trends indicate that the EL evolved from the basanites by fractional crystallization. Major element mass balance calculations and trace element models show that fractionation of 16% olivine, 52% clinopyroxene, 14% Fe-Ti oxides, 11% feldspar, 3% nepheline, and 3% apatite from a basanite parent leaves 23.5% anorthoclase phonolite. The large volume of phonolite at Mt. Erebus requires significant basanite production. This occurs by low degrees of partial melting in a mantle plume (here termed the Erebus plume) rising at a rate of about 6 cm/yr. (Auth. mod.)

E-46906
Harley, S.L., Buick, I.S., **Wollastonite-scapolite assemblages as indicators of granulite pressure-temperature-fluid histories: the Rauer Group, East Antarctica,** *Journal of petrology,* June 1992 33(3), p.693-728, Refs. p.725-727.

Mid-Proterozoic (about 1000 Ma) granulite facies calc-silicates from the Rauer Group, East Antarctica, contain grossular-wollastonite-scapolite-clinopyroxene (+/- quartz or calcite) assemblages which preserve symplectite and corona textures typically involving the growth of secondary wollastonite. The textures include wollastonite rims between quartz and calcite; wollastonite-plagioclase rims and intergrowths between quartz and scapolite; wollastonite-scapolite-clinopyroxene intergrowths replacing grossular; and wollastonite-plagioclase symplectites replacing grossular or earlier symplectites. Reactions between grossular, scapolite, wollastonite, calcite, quartz, anorthite, and vapor have been modelled in the CaO-Al2O3-SiO2-H2O-CO2 and more complex systems, using the internally consistent data-set of Holland & Powell (1990). Reactions producing scapolite and wollastonite consume vapor as temperature increases (i.e., carbonation). These calc-silicates can therefore behave as fluid sinks under high-grade conditions. Conversely, they may be important fluid sources on cooling and contribute to the formation of post-metamorphic CO2-rich fluid inclusions in isobarically cooled granulites. (Auth. mod.)

E-46917
Kuehner, S.M., **Experimental determination of the emplacement pressure of Proterozoic mafic dikes within portions of the East Antarctic Shield,** *Lithos,* June 1992 28(1), p.21-42, Refs. p 40-42.

In order to further constrain previous determinations of the P-t (pressure-time) path of two portions of the East Antarctic Shield, the depth (pressure) under which two Proterozoic dike suites were emplaced in the Vestfold Hills Block was determined by experimentally reproducing the equilibrium phenocryst assemblage found in their chilled margins. The phenocryst assemblage (oliv+opx) of a high

Mg tholeiite sample (ca. 2420 Ma) could only be experimentally reproduced at 7.5 kbar. It was also found that at 7.5 kbar the Ca-Mg-Fe components of the synthetic orthopyroxene very closely matched the natural phenocryst concentrations. Results are consistent with pressures of 8.0 and 5.3 kbar obtained for the Mg- and Fe-rich tholeiite samples, respectively, using geobarometry applied to the groundmass assemblages. Emplacement pressures of compositionally similar dikes from the Napier Complex were estimated by comparison with previous experimental studies. The comparison shows that a Napier Complex high-Mg tholeiite suite (ca. 2350 Ma) and an Fe-rich tholeiite suite (ca. 1190 Ma) were both emplaced at a pressure of 8 kbar. (Auth. mod.)

E-46929

Godoy, E., Dobbs, M., **Recent volcanism across the Bransfield Strait** [Vulcanismo reciente transversal al estrecho Bransfield: consideraciones geoquímicas, geocronológicas y paleomagnéticas], *Santiago de Chile. Instituto Antártico Chileno. Serie científica,* 1992 No.42, p.9-20, In Spanish with English summary. 20 refs.

Penguin I., Melville Peak, Bridgeman I. and Paulet I. form a partial cross section in the NE Bransfield Strait. They all consist of clinopyroxene and/or olivine basalts, yet show different chemical compositions. Penguin basalts are Na_2O enriched when compared to those from Melville and Bridgeman. Their Ti/Y to Nb/Y ratios point to a source enrichment. The back-arc alkaline basalts from Paulet instead could derive from a low (5%) partial melting percentage of lherzolithic mantle. They are nepheline normative and show a positive Nb anomaly. The Y values reported here are consistently higher than those from published analyses. In a Cr-Y diagram, they lower the previous estimates of degree of partial melting for Penguin and Bridgeman magmas. They remain, however, much higher than those derived from enrichment factor modeling. Both a K-Ar dating of a basaltic dyke from Melville Peak and the normal polarity preserved in all the islands prove that its volcanism is of recent age. (Auth.)

E-46944

Sanz, J.L., Acosta, J., Herranz, P., **Seismic reflection data on recent geodynamic evolution of the South Shetland margin and the Bransfield Strait** [Nuevos datos de sísmica continua por reflexión sobre la evolución geodinámica reciente del margen de las Shetland del Sur y estrecho de Bransfield], Actas del tercer Symposium Español de Estudios Antárticos. Gredos, 3 al 5 de octubre de 1989. (Spanish Symposium on Antarctic Studies, 3rd, Gredos, Oct. 3-5, 1989. Proceedings), [Madrid], Comisión Interministerial de Ciencia y Tecnología, [1990], p.271-280, In Spanish. 7 refs.

Seismic profiles obtained during the Antártida 8611 and the Ex-antarte 88-89 expeditions in the South Shetland Is.-Bransfield Strait area are discussed. Analysis shows that the Bransfield rift is located toward the center of the Strait and is independent of the active Deception-Bridgeman fold. The islands seem to have functioned as independent blocks, with evidence of recent uplifts.

E-46955

Jordan, R.W., **Unusual diatom layers in Upper Pleistocene sediments from the northern Weddell Sea,** *Deep-sea research,* 1991 38(7), p.829-843, Refs. p.841-843.

A sediment core from Jane Basin, northern Weddell Sea, contains distinct bands up to 3 cm thick of well preserved diatom frustules, contrasting with the generally poor preservation of adjacent material. Most notably, the fragile diatom genus *Corethron* is abundant in the layers and found as whole valves, while in the remainder of the core it is rare and valves are broken and corroded. Extrapolation from contemporary data on phytoplankton production and standing crop suggests that the silicon content of the diatom ooze layers is very much greater than could be expected from a single year's phytoplankton production sedimenting from a corresponding area of the water column. Assuming direct quantitative sedimentation, it would have taken decades to centuries to accumulate 3 cm of diatom ooze. The preservation of these layers indicates that unusual conditions prevailed, so that diatom valves settled through the water column more or less unaltered, and remained preserved in this state in the sediment. Mass sedimentation of a diatom bloom followed by rapid burial seems the most likely combination of circumstances that could have caused this. (Auth. mod.)

E-46956

Pirrie, D., Marshall, J.D., **Field relationships and stable isotope geochemistry of concretions from James Ross Island, Antarctica,** *Sedimentary geology,* 1991 Vol.71, p.137-150, Refs. p.149-150.

Early diagenetic (precompactional) concretions are abundant throughout the Cretaceous-Tertiary Marambio Group, Larsen Basin, Antarctica. Four distinct concretion types are recognized: spherical-subspherical concretions; sheet concretions; fossil-nucleated concretions; and concretionary burrow networks. All concretion types have a micritic to microsparry variably non-ferroan to ferroan calcite cement. Stable isotope analyses show a wide spread in both delta O-18 and delta C-13. Delta C-13 values are typically negative, ranging between -3.38 and -39.15 per mill (PDB) (usually -16 to -30 per mill). Delta O-18 ranges between -1.2 and -13.81 per mill (PDB) with most values between -5 and -10 per mill. The delta C-13 signature is interpreted to represent carbon sourced from sulphate reduction and/or methane oxidation, with minor input from shell dissolution, and is consistent with a shallow burial, early diagenetic origin. A single mudstone hosted concretion has a delta O-18 composition indicative of precipitation of carbonate from seawater. The low delta O-18 signatures in the sandstone- and siltstone-hosted concretions are possibly due to early diagenetic modification of the pore water composition, through volcaniclastic mineral dissolution/reprecipitation reactions and perhaps through input of meteoric water. Concretion distribution is related to changes in sedimentation rate and the dominance of diffusion on concretion cementation. (Auth.)

E-46957

Pirrie, D., Crame, J.A., Riding, J.B., **Late Cretaceous stratigraphy and sedimentology of Cape Lamb, Vega Island, Antarctica,** *Cretaceous research,* 1991 Vol.12, p.227-258, Refs. p.254-257.

An important new section for the latest Cretaceous marine sedimentary record is described from Cape Lamb. Some 480 m thick, it has been divided into three lithostratigraphic units of member status. Both micro- and macrofossil evidence indicate that members A and B are of late Campanian to early and mid-Maastrichtian age; the latter unit is unconformably overlain by the late Maastrichtian Member C. Definition of the lithostratigraphic units will aid local correlations within the James Ross I. area. Partial correlation with the major Cretaceous-Tertiary boundary reference section on Seymour I. has been achieved using both ammonite and dinoflagellate cyst taxa. It is apparent that there are major lithofacies differences between the two localities, which are thought to reflect a proximal to distal depth gradient into the depositional basin. The macrofauna has been grouped into two broad associations: a lower one based on the ammonite *Gunnarites* and an upper one based on *Maorites.* It is hoped that this sequence may form the basis of a formal kossmaticeratid ammonite zonation of the latest Cretaceous of the southern Gondwana margins. The sedimentology of members A and B reflects deposition in a shelf setting, and records a transgressive-regressive pulse. Member C was deposited in shelf, shoreface and marginal marine environments, and shows evidence of both coeval arc volcanism and localized basin uplift.

E-46961

Crame, J.A., Pirrie, D., Riding, J.B., Thomson, M.R.A., **Campanian-Maastrichtian (Cretaceous) stratigraphy of the James Ross Island area, Antarctica,** *Geological Society of London. Journal,* 1991 Vol.148, p.1125-1140, Refs. p.1139-1140.

One of the most important outcrops of uppermost Cretaceous (Campanian-Maastrichtian) sedimentary rocks in the southern high latitudes occurs within the James Ross I. group. These rocks comprise a 1500-2000 m thick sequence of predominantly shallow marine clastic sediments that were deposited within a retro-arc basin. They are virtually undeformed and have yielded prolific invertebrate and vertebrate faunas, and a wide range of plant taxa. Campanian-Maastrichtian strata are contained within two component formations of the Upper Cretaceous-lower Tertiary Marambio Group. The lower Santa Marta Formation is approximately 1100 m thick and has 3 constituent members. Ammonites within the Santa Marta Formation indicate an early to late Campanian age assignment. Dinoflagellates suggest that the lower levels of the formation may range into the Santonian Stage. In the northern James Ross I. to Vega I. region there is a conformable transition into the overlying López de Bertodano Formation. The correlation presented provides the basis for a formal subdivision of the Campanian and Maastrichtian stages in the southern high latitudes. It has also revealed two major basin shallowing events (in the late Campanian-early Maastrichtian and latest Maastrichtian) and the existence of a major fault/fault zone across southeastern James Ross I. (Auth. mod.)

E-46977

Allibone, A.H., **Low pressure/high temperature metamorphism of Koettlitz Group schists, Taylor Valley and upper Ferrar Glacier area, South Victoria Land, Antarctica,** *New Zealand journal of geology and geophysics,* 1992 35(2), p.115-127, Refs. p.125-127.

Koettlitz Group metasediments of the Taylor Valley and upper Ferrar Glacier region contain rare horizons of garnet-bearing and pelitic schist, together comprising 2% of the exposed outcrop. Pelitic schists containing the upper amphibolite facies assemblage quartz-sillimanite-cordierite-biotite-garnet-K-feldspar-relict andalusite are restricted to The Defile in the lower Taylor Valley. In the upper Taylor Valley, muscovite-K-feldspar-quartz-plagioclase-biotite assemblages occur adjacent to anatectic migmatites and quartz-K-feldspar-garnet-biotite-plagioclase assemblages, with one sample containing sillimanite as inclusions in garnet. At the confluence of the Darkowski and Ferrar Glaciers, quartz-biotite-plagioclase-garnet schists contain rare quartz-plagioclase-cordierite leucosomes. Phase relations indicate peak metamorphic temperatures and pressures of 700 +/- 50 C and 4-5 kbar throughout the Taylor Valley and upper Ferrar Glacier area. The presence of relict andalusite in sample 56816 suggests a low pressure prograde history, but the lack of relict pelitic schist assemblages preserved in garnet porphyroblasts prevents definition of a pressure/temperature trajectory. (Auth. mod.)

E-46982

Bohannon, R.G., Eittreim, S.L., **Tectonic development of passive continental margins of the southern and central Red Sea with a comparison to Wilkes Land, Antarctica,** *Tectonophysics,* Nov. 20, 1991 198(2-4), p.129-154, Refs. p.151-154.

The continental margins of the southern and central Red Sea and most of Wilkes Land have bulk crustal configurations and detailed structures that are best explained by a prolonged history of magmatic expansion that followed a brief but intense period of mechanical extension. Extension on the Red Sea margins was spatially confined to a rift that was 20-30 km in width. The rifting phase along the Arabian margin of the central and southern Red Sea occurred 25-32 Ma ago, primarily by detachment faulting at upper crustal levels and ductile uniform stretching at depth. Rifting was followed by an early magmatic phase during which the margin was invaded by dikes and plutons. The Wilkes Land margin is similar to the Arabian example. The margin is about 150 km in width, the amount of upper crustal extension is too low to explain the change in sub-sediment crustal thickness from about 35 km on the mainland to <10 km beneath the margin, and reflectors in the deepest seismic sequence lie nearly flat. The model used requires large volumes of melt in the early stages of continental rifting. The voluminous melt might be partly a product of nearby hot spots, such as Afar, and partly the result of an initial period of partial fusion in the deep continental lithosphere under lower temperatures than ordinarily required by dry solidus conditions. (Auth. mod.)

E-46989

Keller, R.A., Fisk, M.R., White, W.M., Birkenmajer, K., **Isotopic and trace element constraints on mixing and melting models of marginal basin volcanism, Bransfield Strait, Antarctica,** *Earth and planetary science letters,* July 1992 111(2/4), p.287-303, 51 refs.

Quaternary volcanism occurs in Bransfield Strait as subaerial and submarine volcanoes aligned on the inferred axis of rifting, and as two subaerial, off-axis volcanoes on the northern margin of the strait. The Bransfield Strait lavas are similar to published analyses from other marginal basins, ranging from basalts and basaltic andesites to trachytes. They exhibit moderate enrichments in alkali and alkaline earth elements relative to high-field-strength elements that are typical of many back-arc basin basalts. The seamount basalts have trace element chemistry similar to enriched mid-ocean ridge basalts (E-MORB), but with variously higher alkali and alkaline earth element concentrations and, frequently, lower Nb. Low-pressure fractional crystallization accounts for most of the compositional variation within individual volcanoes, but it does not explain intervolcano differences even though the volcanoes are closely spaced and presently or recently active. Melting of depleted mantle mixed with 0.5-2% crust or sediment explains the isotopic and trace element variations not accounted for by magma chamber processes. Some of the lavas have Rb/Sr too low to account for their Sr-87/Sr-86, perhaps due to the loss of Rb during mantle metasomatism or interaction between slab-derived fluids and the mantle source of the basalts. Strontium, neodymium, and Pb-207/Pb-204 isotopic signatures remained constant during the transition from Tertiary island arc volcanism to Quaternary marginal basin volcanism, but Pb-206/Pb-204 increased. (Auth. mod.)

E-46994

Surova, T.G., Vtiurin, B.I., Troitskiĭ, L.S., **Spores and pollen from the glaciers and periglacial zone of the Arctic and Antarctica** [Pyl'tsa i spory s lednikov i prilednikovoĭ zony Arktiki i Antarktidy], *Materialy gliatsiologicheskikh issledovaniĭ,* May 1991 Vol.72, p.181-185, In Russian with English summary. 9 refs.

Results of spore-pollen analysis of surface samples obtained from glaciers and in periglacial zones of the Arctic (Spitsbergen) and Antarctica are presented. Spore-pollen spectra of surface samples from Spitsbergen contain spores and pollen transported from far-away regions as well as from local vegetation. The small amount of pollen and spores in samples from glaciers is the result of transport through a single year only, while spore-pollen spectra from periglacial zones contain a combination of pollen and spores accumulated over several decades and even centuries. The composition of spectra from the Colsdalen Valley reflects, as a rule, local vegetal associations. Surface samples obtained in Antarctica mainly contain pollen and spores transported from New Zealand and South America. A man- made source of these is possible. It is evident that spore- pollen analysis of ground samples in high latitudes helps to specify the functioning of the Earth's atmospheric circulation now and in the recent past. (Auth. mod.)

E-47001
Buatois, L.A., Lopez Angriman, A.O., **Ichnology of a submarine braided channel complex: the Whiskey Bay formation, Cretaceous of James Ross Island, Antarctica,** *Palaeogeography, palaeoclimatology, palaeoecology,* July 1992 94(1-4), p.119-140, Refs. p.137-140.

Cretaceous rocks of the Whisky Bay Formation in northwest James Ross I. are described in terms of lithology, bed geometry, fabric, sedimentary structures and trace fossils. They are interpreted as a braided submarine channel complex in the inner part of a submarine fan. Nine lithofacies grouped in four lithofacies associations are defined. Major braided channel association is characterized by gravelly turbidity current and debris flow deposits. Terrace and minor braided channel association records the action of high density gravelly and sandy turbidity currents. Sandy plain association may represent deposition by "classical" turbidity currents. Interchannel area association shows low density turbidity currents and suspension sedimentation, far away from channel processes. A brief description of trace fossils present in the unit is given and environmental implications of their distribution are emphasized. *Arenicolites* isp., *Diplocraterion parallelum, Palaeophycus tubularis, Planolites* cf. *P. ophthalmoides, Skolithos linearis* and *Thalassinoides suevicus* make up the ichnocoenosis A. It mainly represents dwelling-feeding structures (Domichnia) of suspension feeders in minor channels, marginal terraces and sandy proximal plains. The presence of these "shallow-water" traces is related to local conditions (high energy, sandy substrate, intermittent oxygenation and slow build-up of organic detritus), rather than bathymetry. *Cylindrichnus concentricus, Chondrites* isp. and *Zoophycos* isp. (large and small form) make up the ichnocoenosis B. It is composed of deep deposit-feeders feeding structures (Fodinichnia) in interchannel areas. Ethologic group Agrichnia is completely absent. (Auth. mod.)

E-47005
Taylor, E.L., Taylor, T.N., Cúneo, N.R., **Present is not the key to the past: a polar forest from the Permian of Antarctica,** *Science,* Sep. 18, 1992 257(5077), p.1675-1677, 12 refs.

An *in-situ* Upper Permian fossil forest in the central Transantarctic Mountains near the Beardmore Glacier includes 15 permineralized trunks in growth position; the paleolatitude of the site was approximately 80 to 85S. Numerous leaves of the seed fern *Glossopteris* are present in the shale in which the trunks are rooted. The trunks are permineralized and tree rings reveal that the forest was a rapidly growing and young forest, persisting in an equable, strongly seasonal climate—a scenario that does not fit with some climate reconstructions for this time period. (Auth.)

E-47012
Weed, R., Norton, S.A., **Siliceous crusts, quartz rinds and biotic weathering of sandstones in the cold desert of Antarctica,** Developments in geochemistry 6. Diversity of environmental biogeochemistry. Edited by J. Berthelin, Amsterdam, Elsevier Publishers, 1991, p.327-339, 36 refs.
DLC QH343.7.D58 1991

Sandstones of the Paleozoic Beacon Supergroup in the Dry Valley region of Antarctica (also known as the Ross Desert) undergo at least three chemical weathering processes. (1) Exudation of oxalate +/- other chelators by endolithic microorganisms causes translocation of elements, producing distinctive Fe pigment patterns and accelerating mechanical weathering (exfoliation) in rocks colonized by endolithic organisms. (2) Formation of thin siliceous crusts stabilizes rock surfaces. The siliceous crusts form by accumulation and *in situ* alteration of airborne dust composed of quartz, clays, and Fe oxyhydroxides. Crust textures include petrographically amorphous lenses of silica, stained and laminated birefringent coatings, and chalcedonic protrusions in surface pits. (3) Silicification of porous quartz sandstones by growth of quartz in optical continuity with host grains produces impermeable rinds up to several cm thick. The rinds form by transport of silica toward subaerially-exposed surfaces due to wet/dry and warm/cold cycling of microenvironments. The resulting interstitial precipitates commonly trap pre-existing grain coatings in pores, thereby preserving biogenic pigment patterns in colonized rocks as trace fossils of endolithic microorganisms. The siliceous crusts and quartz rinds occur on colonized sandstones as well as on rocks without visible colonization. Calibration of their thicknesses on boulders of moraines of approximately known age permits age estimates of this assemblage of geological and biological weathering features. The time scales for all these processes are approx. 10,000 to 1,000,000 years, suggesting that biological activity in the antarctic cold desert is extremely low and that cold, arid conditions have persisted on the order of 2 million years. (Auth. mod.)

E-47044
Ehrmann, W.U., Melles, M., Kuhn, G., Grobe, H., **Significance of clay mineral assemblages in the antarctic ocean,** *Marine geology,* Aug. 1992 107(4), p.249-273, 60 refs.

In late Mesozoic to Paleogene sediments, clay mineral assemblages are sensitive tools for reconstructing climatic conditions. For example, the shift from smectite-dominated assemblages to illite- and chlorite-dominated assemblages in the earliest Oligocene clearly documents the transition from chemical weathering conditions under a warm and humid climate to physical weathering under cooler conditions. Submarine elevations such as Maud Rise and Kerguelen Plateau give the best record for direct paleoclimatic and paleoceanographic studies. At the proximal sites of the continental slope and shelf, as well as in the deep sea, the paleoclimatic information normally is masked by a variety of processes resulting in sediment redistribution. At those sites, in contrast, the clay mineral assemblages bear a wealth of information on different sedimentary processes. After the establishment of a continental East Antarctic ice sheet, physical weathering prevailed. Variations in the clay mineral records predominantly reflect the influence of different sediment sources resulting from different glacial, hydrographic or gravitational transport processes. Because these sedimentation processes are generally linked to climatic variations, the clay mineral assemblages in most of the Neogene and Quaternary sediments provide indirect paleoclimatic information. (Auth. mod.)

E-47045
Mackensen, A., Ehrmann, W.U., **Middle Eocene through Early Oligocene climate history and paleoceanography in the southern ocean: stable oxygen and carbon isotopes from ODP sites on Maud Rise and Kerguelen Plateau,** *Marine geology,* Sep.1992 108(1), p.1-27, 84 refs.

Both benthic and planktic *delta*O-18 values document a cooling trend beginning around 49.5 Ma at all sites. During the late middle Eocene, planktic *delta*O-18 values indicate a steepening latitudinal temperature gradient from 14 C at the northern sites towards 10 C at the southernmost sites. Between 45 and 40 Ma, average paleotemperatures were between 5 and 7 C in deep and intermediate water masses, while near-surface water masses ranged between 6 and 10 C. During the late Eocene, between 40 and 36 Ma, average temperatures further decreased to 4-5 C in the deep and intermediate water masses and to 5-8 C near the sea surface. Abruptly increasing *delta*O-18 values at approximately 35.9 Ma correlate exactly with a sharp pulse in the deposition of ice- rafted material on the Kerguelen Plateau, a dramatic change in clay mineral composition, and an altered southern ocean circulation indicated by a differentiation of benthic *delta*C-13 values between sites, increasing opal concentrations and decreasing carbonate contents. For planktic and benthic foraminifera this *delta* O-18 increase ranges between 1.0 and 1.3 per mill, and between 0.9 and 1.4 per mill, respectively. A hypothesis is offered that explains most of the *delta*O-18 shift at 35.9 Ma with a buildup of a continental East Antarctic ice sheet. Consequently, relatively warm Oligocene antarctic surface water temperatures probably are explained by a temperate, wet-based nature of the ice sheet. This would also aid in the fast build-up of an ice sheet by enhancing the moisture transport onto the continent. (Auth. mod.)

E-47048

Pyle, D.G., Christie, D.M., Mahoney, J.J., **Resolving an isotopic boundary within the Australian-Antarctic Discordance,** *Earth and planetary science letters,* Aug. 1992 112(1/4), p.161-178, 61 refs.

New Sr, Nd and Pb isotopic analyses of MORB glasses from the Australian-Antarctic Discordance (AAD) confirm the presence of an abrupt boundary between 'Indian' type and 'Pacific' type MORB mantle. The transition between these two upper mantle reservoirs is gradational along 40 km of the easternmost AAD spreading center (i.e. segment B5W) and terminates at its western ridge-transform intersection. Axial lavas dredged immediately west of the B4/B5 transform are unequivocally derived from an 'Indian' MORB source, whereas axial lavas dredged east of this transform have a 'Pacific' type signature with evidence of an 'Indian' MORB imprint. Off-axis sampling of the easternmost AAD spreading segment shows these lavas to have been derived from an 'Indian' type source, indicating that the isotopic boundary has migrated westward into the AAD in the last 3-4 Myr. Pacific mantle must flow beneath the B5 spreading axis at a rate of about 25 mm/yr in order for it to displace Indian mantle as the source of melt for this segment. The gradational character of the boundary suggests that, as the westward migration of 'Pacific' mantle progresses, an increasing memory of a remnant 'Indian' signature is incorporated into lavas near the leading edge of the boundary zone. At present, approximately equal proportions of 'Pacific' and ' Indian' mantle contribute to the isotopic signature of lavas erupted 10 km east of the B4/B5 spreading axis offset at about 126E.

E-47058

Anderson, M.E., **Origin and evolution of the antarctic ichthyofauna,** Fishes of the southern ocean, edited by O. Gon and P.C. Heemstra, Grahamstown, South Africa, J.L.B. Smith Institute of Ichthyology, 1990, p.28-33.

DLC QL637.2 F57 1990

Most recent theoretical contributions relevant to a discussion of the origin and evolution of Recent antarctic fishes are essentially restatements of previous works with little new data to support them. Earlier authors characterized the Recent fauna as being composed of two parts: (1) the dominant perciform Notothenioidei, originating with a temporally imprecise Tertiary cooling and isolation of Antarctica, and (2) other teleosts and skates (Rajidae) implicated in a Quaternary dispersal into high latitudes of the southern ocean as a result of world-wide Pleistocene ocean cooling, chiefly along the western coastlines of the Americas and Africa. Over the last twenty years, great improvements have developed in knowledge of southern ocean palaeoceanography and the structure of ocean circulation and continental drift theory by the processes of plate tectonics. These physical data, coupled with recent fossil discoveries and preliminary phylogenetic inference on the origin of the Notothenioidei, allow a more rigorous analysis of the origin of the Recent fish fauna. The first thing that becomes apparent is that earlier authors were seemingly correct in correlating the radiation of notothenioids to the cooling and isolation of Antarctica. This important event is now timed with the close of the Eocene, about 38-40 million years ago, when the existing coastal antarctic fauna almost completely disappeared to be replaced by a proliferation of the new, cold-adapted forms. (Auth. mod.)

E-47118

Harvey, R.P., **Studies of antarctic meteorites: A statistical comparison of antarctic finds and non-antarctic falls; and the origin and significance of cosmic dust from the Walcott Névé, Antarctica,** Pittsburgh, University of Pittsburgh, 1990, 111p., University Microfilms order No. 91-20133, Ph.D. thesis. Refs. p.82-85.

The masses and numbers of meteorites in 4 meteorite samples (the modern falls, antarctic finds, Yamato finds and Allan Hills Main icefield finds) are compared. The mass frequency distributions and the proportions of different classes of meteorites differ between antarctic finds and modern falls. Several well-known distributions, when compared to the samples, give varying degrees of fit. In 4 of 6 sediment samples returned from locations around the Walcott Névé area, a high concentration of ablation spherules was found, averaging roughly 20 spherules per g bulk sediment. These concentrations have an origin similar to that of antarctic meteorites; strong katabatic winds cause cosmic dust ablating out of blue ice to be transported downwind and downslope to the nearest aeolian sediment trap. In the Walcott Névé, these traps are the crests of moraines, weathering debris around boulders and rough, exposed areas of snow. (Auth. mod.)

E-47120

Kaczaral, P.W., **Trace element analysis of L and LL chondrites: Comparison of antarctic and non-antarctic meteorite populations,** West Lafayette, Purdue University, 1986, 150p., University Microfilms order No. 89-00615, Ph.D. thesis. Refs. p.144-150.

Compositional data are reported for mobile/volatile trace elements Au, Co, Se, Ga, Rb, Cs, Te, Bi, In, Ag, Zn, Tl and Cd in antarctic L chondrites and both antarctic and non-antarctic LL chondrites. A comparison of previously obtained non-antarctic L chondrite data to L chondrite results obtained in this work indicates that significant reason exists to doubt that the two meteorite populations derived from the same parent source. Of the 13 trace elements examined, 7 showed statistically significant differences between mildly-shocked populations; the antarctic collection had the lower mean elemental concentration in each of those 7 cases. Two-element plots and correlation profiles also indicated significant differences between antarctic and non- antarctic populations. Shock-induced trace element mobilization, a major determinant of trace element contents in non-antarctic L chondrites, plays a minor role in determining elemental abundances in antarctic L chondrites. After ruling out alternative explanations, the author believes that these differences have a preterrestrial origin, which are attributed to a changing meteorite flux with time. (Auth. mod.)

E-47122

Olinger, C.T., **Isotopic measurements of solar noble gases in individual micrometeorites from Greenland and Antarctica,** St. Louis, Washington University, 1990, 222p., University Microfilms order No. 91-14698, Ph.D. thesis. Refs. p.178-191.

Noble gases were studied in individual 100 micron-size particles selected from Greenland and antarctic glacial sediments. Noble gas isotopic and elemental patterns confirm the extraterrestrial origin of 81 out of 302 particles studied. In addition to mostly melted particles, relatively unmelted particles represent about 1/3 of the samples that are unambiguously extraterrestrial. Many particles studied are compositionally and morphologically similar to known meteoritic material. Although selection criteria based on such similarities can reliably identify particles of likely extraterrestrial origin, some particles of clear extraterrestrial origin would be missed. At least 4 cosmic particles in this study would not have been selected based on any compositional/morphological similarity to known meteorites. (Auth. mod.)

E-47125

Sheraton, J.W., Black, L.P., Tindle, A.G., **Petrogenesis of plutonic rocks in a Proterozoic granulite-facies terrane—the Bunger Hills, East Antarctica,** *Chemical geology,* June 25, 1992 97(3/4), p.163-198, Refs. p.195-198.

Several compositionally varied suites of plutonic rocks (gabbro-quartz monzogabbro, granite, quartz monzodiorite) in the Bunger Hills were emplaced at depths of about 20 km over a relatively short time interval (1170-1150 Ma) during the waning stages of granulite-facies metamorphism, the peak of which occurred about 1190 Ma. Alkaline (syenite to granite) rocks were emplaced west of the Denman Glacier at David I. about 515 Ma. Most of these rocks crystallized from magmas derived by melting of heterogeneous mantle comprising at least two components—Nb-poor, long-term enriched lithosphere, and a Nb-rich OIB (ocean island basalt) -type within-plate component. Metasomatic enrichment of the source of the plutonic rocks, as well as that of 500-Ma alkaline dykes, may have been contemporaneous with continental crust formation in the area during the late Archaean or Early Proterozoic. Much of the chemical variation of the different suites can be explained by fractional crystallization, but other processes, particularly variations in the extent and/or *P-T* conditions of melting, were also important. Crustal contamination does not appear to have been a major factor in the petrogenesis of the Bunger Hills magmas, but cannot be entirely discounted, particularly for some of the granitic rocks; the more evolved David I. syenitic intrusives may have been derived by melting of lower-crustal rocks. (Auth.)

E-47126

Xie, Y.Y., **Geochemistry of sediments and environment in Xihu Lake of Great Wall Station of China, Antarctica,** *Science in China. Series B,* June 1992 35(6), p.758-768, 4 refs.

Results obtained by multielement analysis of the 260 cm deep core of bottom sediments of Xihu Lake, in the Great Wall Station area, show the following: the Cenozoic volcanic rocks around Xihu Lake are the main source of its sediments; the chemical differentiation in very fine particles is still detectable; from the variation of ratios of Cs/Rb, Br/Cl and La/Yb in the clay fraction with depth, and from the variation of CaCO3 contained in the sediments—cation replacing amount in the clay grains and the sediment grain sizes in time—it can be seen that since 3600 B.P. climatic variations of warm-cold-warm took place, which is consistent with the advance and retreat history of the ice sheet in this area. (Auth.)

E-47129

Evans, K.R., ***Marocella:* antarctic specimens of an enigmatic Cambrian animal,** *Journal of paleontology,* July 1992 66(4), p.558-562, Refs. p.561-562.

Remarkably well-preserved specimens of *Marocella* Geyer, 1986, from the Lower Cambrian Shackleton Limestone of Antarctica show that although affinity with chondrophorine cnidarians is improbable, its rigid caplike shell also is unlike that of any known mollusk. Association with sclerite-bearing taxa cannot be ruled out, but at present the phylogenetic affiliation of the genus remains equivocal. (Auth.)

E-47130

Fleming, T.H., **Chemical and isotopic variations in an iron-rich lava flow from the Kirkpatrick Basalt, north Victoria Land, Antarctica: implications for low-temperature alteration,** *Contributions to mineralogy and petrology,* Sep. 1992 111(4), p.440-457, Refs. p.454-457.

Chemical and isotopic (Sr, O, H) variations have been examined in an iron-rich lava flow of the Kirkpatrick Basalt from the Mesa Range in north Victoria Land. The flow is homogeneous with respect to the less mobile elements, whereas variations observed in K, Na, Si, Fe, and Rb result largely from alteration of glassy matrix material. Whole-rock Rb-Sr isotope data fall along a poorly-defined 103 Ma array attributed to secondary mobilization of Rb during the mid-Cretaceous. Alteration at that time is suggested by paleomagnetic data, and would also account for discordant K-Ar dates. Whole-rock delta D values (-201 to -243 per mill) are markedly depleted, approaching equilibrium with modern meteoric water. In light of the data, variable Sr and O isotopic ratios in the underlying sequence of flows, previously interpreted in terms of an assimilation-fractionation model, may largely reflect post-magmatic alteration. (Auth. mod.)

E-47137

Findlay, R.H., Wright, T.O., Dallmeyer, R.D., **Age of cleavage development in the Ross orogen, northern Victoria Land, Antarctica: evidence from Ar-41/Ar-39 whole-rock slate ages: Discussion/Reply,** *Journal of structural geology,* July 1992 14(7), p.887-892, 19 refs. For paper under discussion see 19E-44400.

Findlay states that the *S*1 schistosity in the Millen Range schist and the regional, upright NW-trending slaty cleavage of the Robertson Bay terrane formed at 500 Ma during the Ross orogeny. A subsequent deformation associated with thrusting produced the *S*2 crenulation cleavage in the Millen Range schist. The thrusting involved west-over-east transport. Wright and Dallmeyer's description of the structural geology is brief to the point of confusing to workers not familiar with the local geology. It is essential to clarify the ambiguities created by their structural interpretation. Therefore in this discussion, necessary corrections to the map given by them are presented, the relationship between *S*1 and thrusting are discussed as is the vergence of thrusting. In reply, Wright and Dallmeyer conclude: there is no reason to alter their earlier conclusions; the discussion of the terrane boundary fault(s) was confusing and their origins, local names, and correlations needed clarification. The concept of a separate 'Millen Terrane' is no longer useful or valid and should be discarded; there is insufficient evidence for a Siluro-Devonian event in NVL.

E-47142

Wever, H.E., Storey, B.C., **Bimodal magmatism in northeast Palmer Land, Antarctic Peninsula: geochemical evidence for a Jurassic ensialic back-arc basin,** *Tectonophysics,* Apr. 30, 1992 205(1-3), p.239-259, 50 refs.

Major- and trace-element (XRF and INAA) and Nd-isotope analyses are presented on a Jurassic bimodal association of basic greenstones and silicic metavolcanic rocks from the Black Coast, northeast Palmer Land. The greenstones are divided into three sub- groups, indistinct in the field, but which have geochemical characteristics of island arc tholeiites (group I), E-type MORB (group II), and continental arc basalts (group III). The tholeiites of group I and II have a similar range of Nd permittivity values (+3.7 to -1.2) and were produced from a heterogeneous, large ion lithophile element (LILE)-enriched mantle source. The rocks of group III show a much stronger enrichment in LILE than groups I and II, and were derived from a mantle source with slightly lower Nd permittivity values (-2.3 to -5.0). The silicic volcanic rocks have low Nd permittivity values (-7.1 to - 8.7) indicating a dominant crustal source, although trace element concentrations show a within-plate affinity. The origin and tectonic setting of this bimodal suite is discussed in relation to Mesozoic subduction along the proto-Pacific margin of the Antarctic Peninsula and southern South America and intra-continental extension associated with the break-up of Gondwana. It is concluded that the mafic greenstones and silicic metavolcanic rocks formed in an ensialic back-arc basin setting where, during a period of continental lithospheric attenuation, the rise of a mantle diapir may have caused widespread bimodal magmatism. (Auth. mod.)

E-47143

Stagg, H.M.J., Willcox, J.B., **Case for Australia-Antarctica separation in the Neocomian (ca. 125 Ma),** *Tectonophysics,* Aug. 30, 1992 210(1/2), p.21-32, 21 refs.

An alternative approach to using seafloor spreading data for establishing the age of the breakup of Australia and Antarctica is to determine the relationship of the continental margin sequences and the oceanic crust, using seismic data. Application of this technique to the western Great Australian Bight demonstrates that it is likely that the oldest interpreted oceanic crust is overlain by several hundred meters of sediment that is no younger than Valanginian (ca. 125 Ma); that is, separation of Australia and Antarctica must have occurred prior to this time, perhaps contemporaneously with the separation of Australia and "Greater India" off Western Australia. The similarity of structural and magnetic anomaly trends between the southern and western margins of Australia further suggests that breakup and spreading on those two margins are closely linked. However, there may be further complicating factors in the Australian-Antarctic extension and breakup history. High-quality migrated seismic data from the central Great Australian Bight (GAB), across what has been previously interpreted as oceanic crust, show the presence of listric faulting and apparent syn-rift sedimentation within "basement". The gross structure is similar in appearance to published models of a metamorphic core complex. Other possibilities are that the observed structuring is the product of the re-rifting of oceanic crust of undetermined (pre-Valanginian) age, or that the zone oceanwards of the "COB" consists of highly thinned lower plate, probably injected by ribbons of oceanic basalt towards its southern edge. If such structures can also be identified in the western GAB, then it is clear that the age of the emplacement of the first oceanic crust between Australia and Antarctica is still undetermined. (Auth. mod.)

E-47148

Tomeoka, K., Nomura, K., Takeda, H., **Na-bearing Ca-Al-rich inclusions in the Yamato-791717 CO carbonaceous chondrite,** *Meteoritics,* June 1992 27(2), p.136-143, 22 refs.

Ca-Al-rich inclusions (CAIs) in the Yamato-791717 CO carbonaceous chondrite contain 5 to 80 vol% of nepheline, along with minor sodalite, and thus are among the most nepheline-rich CAIs known. The primary phases in inclusions are mainly spinel, fassaite, aluminous diopside, perovskite, and hibonite. In contrast to many CO chondrites, melilite is rare. Spinel contains variable amounts of Fe (0 to 57 vol% FeAl2O4) and is commonly zoned. Texture suggests that nepheline is a secondary alteration product formed by replacing mainly melilite, fassaite, and spinel; melilite is the most susceptible to alteration of the primary phases, so most of it was probably already consumed to form nepheline. The majority of inclusions are single concentric objects or aggregates of concentric objects. Lightly altered inclusions have cores of spinel surrounded by bands of nepheline (replacing fassaite), fassaite, and diopside. In moderately altered inclusions, spinel cores are replaced by nepheline. In heavily altered inclusions, the major part of internal areas (50 to 80% in volume) are replaced by nepheline. In some moderately and heavily altered inclusions, only diopside rims remain unaltered. Textural relationships indicate that the resistance of primary phases to alteration increases in the order: melilite, fassaite, spinel, diopside. The alteration probably proceeded with reaction of the primary phases with the low-temperature (<1000 K) nebular gas rich in Na, Fe and Cl. The degree of alteration in Y791717 CAIs appears to be much higher than those in CAIs in other reported meteorites. (Auth.)

E-47156

Masquelin, E., Vaz Chavez, N., **Trace element geochemistry in vulcanites from Fildes Peninsula** [Geoquímica de elementos traza en vulcanitas del Grupo Península Fildes, Bahía Fildes, Isla Rey Jorge, Shetland del Sur], *Montevideo. Instituto Antártico Uruguayo. Actividad científica 1987/88,* Sep. 1989 Vol.3, p.39-48, In Spanish with English summary. 9 refs.

Geochemical data derived from the multielement analysis of three different types of volcanic rocks collected around Fildes Bay on King George I. are presented. Vulcanites from the Fildes Peninsula Group may be distinguished from those of Marian Cove by their hydrothermal alteration. Apparently the correlation between Ni and Cr allows for the observation of the stratigraphic separation of samples of the same kind. Consequently, the correlation between Cu and As shows a distinction between Marian Cove propylitized tuffites and brecciated and pyroclastic rocks from the Fildes Peninsula Group. (Auth.)

E-47181

Yanai, K., ed, NIPR Symposium on Antarctic Meteorites, 16th, Tokyo, June 5-7, 1991, **Proceedings of the NIPR Symposium on Antarctic Meteorites, No.5,** Tokyo, National Institute of Polar Research, 1992, 336p., Refs. passim. For selected papers see E-47182 through E-47198.

This is a collection of papers presented at the 16th Symposium on Antarctic Meteorites held on June 5-7, 1991, in Tokyo. It consists of 17 full length papers directly related to Antarctica; pt. A is titled "Reports of consortium studies", and pt.B "General topics of antarctic meteorites and related subjects". Mineralogy, chemistry and physical properties of various meteorites, including lunar, are discussed.

E-47182

Misawa, K., Tatsumoto, M., Yanai, K., **U-Th-Pb isotopic systematics of lunar meteorite Asuka-31,** NIPR Symposium on Antarctic Meteorites, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1992, p.3-22, Refs. p.20-22.

U-Th-Pb isotopic systematics indicate that Asuka-31 is of lunar origin and was formed 3940 Ma. The Pb isotopic composition is extremely nonradiogenic, compared to those of typical Apollo mare basalts. The Pb-Pb, U-Pb, and Th-Pb ages are concordant at 3.94 Ga. The U-Pb data from maskelynitized plagioclase does not plot on the internal isochrons defined by other mineral separates, indicating that it is disturbed by a later shock event(s). The U-Th-Pb systematics of Asuka-31, combined with previous results, suggest a scenario for the early Pb isotope evolution of the Moon. It is suggested that Asuka-31 originated from partial melting of early cumulates enriched with sulfides. (Auth. mod.)

E-47183

Eugster, O., Michel, T., Niedermann, S., **Solar wind and cosmic ray exposure history of lunar meteorite Yamato-793274,** NIPR Symposium on Antarctic Meteorites, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1992, p.23-35, Refs. p.33-35.

Isotopic abundances of the noble gases were measured in bulk samples and grain-size separates of lunar meteorite Yamato-793274. The presence of relatively high contents of trapped solar wind gases and stable cosmic-ray produced nuclei indicates that Y-793274 consists of submature lunar regolith material; that is, Y-793274 is not quite as rich in solar wind gases as mature lunar soil. The K-40 Ar gas retention age is 2800 +/- 400 Ma. Breccia formation occurred 500-1000 Ma ago as estimated from a trapped ratio Ar-40/Ar-36=2.-

36. The history of exposure to cosmic rays and solar wind particles for Y-793274 is very similar to that for another lunar meteorite, ALHA81005. Because the recovery sites in Antarctica lie 3000 km apart, pairing is not possible. However, the two meteorites may originate from the same ejection event on the Moon, although they are mineralogically different and an inhomogeneous ejection site would have to be assumed. (Auth. mod.)

E-47184

Takaoka, N., Yoshida, Y., **Noble gases in Yamato-793274 and -86032 lunar meteorites,** NIPR Symposium on Antarctic Meteorites, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1992, p.36-48, Refs. p.47-48.

Isotopic abundances of noble gases are reported for whole rock samples, mineral and grain size separates prepared from lunar meteorites Yamato-793274 and -86032. Y-793274 is rich in trapped solar gases, whereas Y-86032 is depleted in them, resembling the Y-82192 and -82193 lunar meteorites. From measurements of radiogenic Ar, the K-Ar age of Y-86032 is calculated to be 3940 +/- 240 Ma, in agreement with the K-Ar and Ar-Ar ages for Y-82192 and -82193. From measurements of cosmogenic noble gases, the total duration of cosmic-ray exposure is calculated to be 510 +/- 140 and 11 +/- 1 Ma for Y-793274 and -86032, respectively. The exposure age of Y-86032 is in good agreement with that for Y-82192/3. The agreement in the K-Ar and exposure ages as well as in the trapped gas abundances supports the earlier finding that Y-86032 is paired with Y-82192 and -82193. (Auth. mod.)

E-47185

Ikeda, Y., **Overview of the research consortium, "Antarctic carbonaceous chondrites with CI affinities, Yamato-86720, Yamato-82162, and Belgica-7904",** NIPR Symposium on Antarctic Meteorites, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1992, p.49-73, Refs. p.69-73.

Three antarctic meteorites, Yamato(Y)-82162, Y-86720, and Belgica(B)-7904, are unusual carbonaceous chondrites having characteristics of both CI and CM chondrite groups. Therefore, a research consortium was carried out in 1987-1990 and the results are summarized as follows: several minerals that are rare or new in carbonaceous chondrites were found in the consortium chondrites; phyllosilicate veins were first found in Y-82162, suggesting that the hydration took place in the parent body; detailed mineralogy and petrology of altered chondrules and clasts suggest that most of the phyllosilicates in chondrules and clasts were produced from anhydrous precursors in the solar nebula; at the final stage of the chondrite formation, the 3 chondrites underwent intense impact-shock or metamorphic heating after the hydrous alteration on their parent body; mineralogical, chemical, and oxygen isotopic data indicate that the 3 chondrites have some characteristics of both CI and CM groups, and the genetical relationships between the 2 groups and the consortium chondrites have been suggested. In addition, a new carbonaceous chondrite group CY is proposed for the 3 unusual chondrites. (Auth. mod.)

E-47186

Kimura, M., Ikeda, Y., **Mineralogy and petrology of an unusual Belgica-7904 carbonaceous chondrite: genetic relationships among the components,** NIPR Symposium on Antarctic Meteorites, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1992, p.74-119, Refs. p.117-119.

Belgica-7904 (B-7904) carbonaceous chondrite consists of abundant chondrules, various clasts, isolated minerals, and a dehydrated phyllosilicate matrix. Chondrules are divided into magnesian and ferroan types. The magnesian type has forsterite phenocryst, often with pyroxene, plagioclase, and unusual Cr-rich ovoid, which are set in a dehydrated phyllosilicate groundmass. Kamacite is abundantly included in the forsterite phenocrysts, and is rarely associated with schreibersite. The ferroan type consists mainly of ferroan olivine phenocryst and dehydrated phyllosilicate groundmass with phosphate, instead of schreibersite in magnesian type. Clasts in B-7904 are classified into 7 types. Mineralogical study suggests that magnesian chondrules, phyllosilicate-rich clasts and Mn-rich olivine-bearing clasts formed under reducing conditions, whereas ferroan chondrules, hortonolite-rich clasts, and the matrix originated under oxidizing conditions. It is suggested that magnesian chondrules were oxidized by a nebular gas of non-solar composition, probably after mixing with ferroan chondrules. All phyllosilicates in B-7904 were dehydrated by intense heating, and the unequilibrated mineral assemblages and the magmatic temperatures retained in some of the chondrules suggest that the heating took place for a short duration, probably by shock heating. (Auth. mod.)

E-47187

Akai, J., **T-T-T diagram of serpentine and saponite, and estimation of metamorphic heating degree of antarctic carbonaceous chondrites,** NIPR Symposium on Antarctic Meteorites, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1992, p.120-135, Refs. p.134-135.

For the estimation of peak thermal metamorphic degree of phyllosilicates in antarctic carbonaceous chondrites, heating experiments of serpentine and saponite were carried out. A T-T-T diagram of serpentine for elevated temperature was obtained by heating the serpentine in the Murchison CM2 chondrite *in vacuo* at different temperatures and for different durations. Serpentine decomposed into olivine and enstatite through characteristic transitional structures. New data on thermally affected phyllosilicates in Yamato(Y)-793321 indicate coexistence of 7 Å unaltered serpentine and a transitional structure. Thermally affected saponite in Belgica(B)-7904 was also documented. Based on the T-T-T diagrams, the peak metamorphic degrees and peak temperatures were estimated in the order of B-7904 equal to or greater than Y-86720>Y-82162>Y-793321. (Auth. mod.)

E-47188

Ikeda, Y., Noguchi, T., Kimura, M., **Petrology and mineralogy of the Yamato-86720 carbonaceous chondrite,** NIPR Symposium on Antarctic Meteorites, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1992, p.136-154, Refs. p.153-154.

Phyllosilicate clasts in Yamato-86720 consist mainly of dehydrated serpentine (or chlorite) and sodian talc (or saponite) components, which are the most homogeneous in chemical compositions among those in CM chondrites. They were produced from chondrules by intense hydrous alteration, resulting in the homogeneous composition of the phyllosilicates. Metal spherules and troilite grains in original chondrules have also altered to ovoidal phyllosilicate inclusions and unusual carbonate-phyllosilicates inclusions, respectively. The CaO content of the original chondrules was retained within them as the unusual carbonate-phyllosilicate inclusions, which resulted in the low CaO content of the Y-86720 matrix. The matrix is different in composition from the clast phyllosilicates, suggesting that the two were produced in conditions different from each other. Pyrrhotite grains in clasts and matrix have altered probably to ferrihydrite, which have produced Fe-rich halos around the pyrrhotite grains after the agglomeration of Y-86720 and prior to a heating event. The heating event took place in the final stage of the chondrite formation, resulting in dehydration of phyllosilicates and reduction of ferrihydrite to Co-Ni-poor kamacite. (Auth.)

E-47189

Miyamoto, M., **Infrared diffuse reflectance spectra of several thermally metamorphosed carbonaceous chondrites,** NIPR Symposium on Antarctic Meteorites, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1992, p.155-164, Refs. p.163-164.

Infrared diffuse reflectance spectra (2.53-25 microns) were measured for several antarctic carbonaceous chondrites. Thermally metamorphosed carbonaceous chondrites with CI-CM affinities (Belgica(B)-7904, Yamato(Y)-793321, Y-82162, and Y-86720) show weaker absorption bands near 3 microns due to hydrous minerals, compared with the Murchison (CM) carbonaceous chondrite. These results show that hydrous minerals are dehydrated as a result of thermal metamorphism, consistent with the results of chemical, mineralogical, and petrologic studies. B-7904, Y-793321, and Y-86720 show weaker absorption bands near 6.9 microns due to carbonates than those of Murchison. For Y-82162, the 1450/cm (6.9 microns) band is relatively strong, unlike the other thermally metamorphosed carbonaceous chondrites, despite the weak 3 microns band of all the thermally metamorphosed ones measured. The shape of the spectral curves near 3 microns of the thermally metamorphosed carbonaceous chondrites resembles those of antarctic ordinary chondrites affected by terrestrial weathering, implying that major absorption features near 3 microns of the thermally metamorphosed carbonaceous chondrites may be due to secondary hydrous minerals produced by terrestrial weathering. (Auth.)

E-47190

Kimura, M., Tsuchiyama, A., Fukuoka, T., Iimura, Y., **Antarctic primitive achondrites Yamato-74025, -75300, and -75305: their mineralogy, thermal history, and the relevance to winonaite,** NIPR Symposium on Antarctic Meteorites, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1992, p.165-190, Refs. p.188-190.

Three antarctic primitive achondrites, Yamato(Y)-74025, -75300, and -75305, were mineralogically and chemically studied. They consist of anhedral to subhedral silicate and opaque minerals. The major constituent minerals are typical of equilibrated ordinary chondrites. Y-75305 has a composite grain containing Cu, Mn, and S, probably consisting of alabandite, an unknown Mn-bearing Cu-sulfide, and digenite. Y-74025 has a REE pattern typical of chondrite. Siderophile elements in Y-74025 are depleted relative to Cl chondrites, which is consistent with poor abundance of Fe-Ni metal in Y-74025. Holocrystalline texture, homogeneous mineral compositions, and high equilibration temperatures for pyroxenes, suggest that these primitive achondrites experienced high-temperature metamorphism. Mineralogical and chemical characteristics suggest that they resemble Winona-like meteorites (winonaites). The composition of pyroxene and olivine and accessory minerals suggest that winonaites formed under an intermediate redox condition between E-chondrites and Acapulco-like primitive achondrites. The abundance of troilite and Fe-Ni metal varies widely. (Auth. mod.)

E-47191

Nagahara, H., **Yamato-8002: Partial melting residue on the "unique" chondrite parent body,** NIPR Symposium on Antarctic Meteorites, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1992, p.191-223, Refs. p.220-223.

Yamato-8002 is classified as a "unique" meteorite having a granoblastic texture with olivine and orthopyroxene and interstitial diopside, plagioclase, spinel, kamacite schreibersite, troilite, and rare graphite. Olivine, orthopyroxene, and clinopyroxene are homogeneous with respect to Mg and Fe, but Ca in pyroxenes is zoned. Plagioclase and spinel are heterogeneous within and among grains. Mineral compositions, particularly plagioclase, spinel and trace elements in all minerals along with oxygen isotopic compositions suggest a genetic link to Y-74063, Y-75274, ALH77081, Y-791493, Acapulco, and Lodran. They were derived from a common precursor through different degrees of partial melting; Y-8002 and Y-75274 have the highest Mg/(Mg+Fe) ratios of olivine, pyroxenes, and spinel, the highest An mol% of plagioclase, and the highest Cr/(Cr+Al) ratio of spinel, indicating formation through the highest degree of partial melting. They were reduced during melting, resulting in crystallization of extremely magnesian minerals. Y-74063, ALH77081, Y-791493, Lodran and Acapulco possess nearly primary composition of the ferromagnesian minerals, except that some have lost and some have added partial melts. (Auth. mod.)

E-47192

Kaneoka, I., Takaoka, N., Yanai, K., **Ar-40/Ar-39 analyses of Y-74063 and ALH-78230: consortium study on unique meteorites from Antarctica,** NIPR Symposium on Antarctic Meteorites, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1992, p.224-232, 18 refs.

As part of a consortium study on unique meteorites from Antarctica, Ar-40/Ar-39 analyses were performed for two meteorites, Y-74063 and ALH-78230, which are related to lodranite and the Acapulco meteorite. Y-74063,93 shows an Ar-40/Ar-39 plateau age of 4556 +/- 53 Ma, containing about 0.0000001 cu cmSTP/g trapped Ar-36. ALH-78230,55 also indicates an Ar-40/Ar-39 plateau age of 4531 +/- 23 Ma in the higher temperature fractions, but the lower temperature fractions suggest the occurrence of a later degassing event around 400-500 Ma. Trapped Ar-36 is about 0.00000001 cu cmSTP/g. These results indicate that the two meteorites Y-74063 and ALH-78230 experienced different thermal histories. (Auth.)

E-47193

Yanai, K., **Yamato-793592: the first enstatite achondrite (aubrite) in the Yamato meteorite collections,** NIPR Symposium on Antarctic Meteorites, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1992, p.235-241, 18 refs.

The first aubrite in the Yamato meteorite collections has been identified as a result of the recent initial processing at the National Institute of Polar Research (NIPR), Tokyo. Yamato-793592 (Y-793592) is the only aubrite recovered so far among about 6000 classified specimens of the Yamato collections. Y-793592 is a friable small stone weighing 32 g, with a white interior covered by a small amount of black fusion crust. It shows the typical brecciated texture and consists mostly of larger angular, white pyroxene (enstatite), less plagioclase and traces of olivine, with some opaque grains (blackish brown color). The constituent minerals of Y-793592 are almost pure Mg-pyroxene (enstatite), pure Mg-olivine (forsterite), sodic plagioclase, and small amounts of opaque phases such as Ni-poor metal, daubreelite, and troilites with highly variable compositions. (Auth.)

E-47194

Yamaguchi, A., Takeda, H., **Mineralogical study of some brecciated antarctic eucrites,** NIPR Symposium on Antarctic Meteorites, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1992, p.242-257, Refs. p.256-257.

Brecciated antarctic eucrites Y-82202, Y-82210, Y-793548, and Y-793570 were studied mineralogically and petrographically. Y-793548, Y-82210, and Y-793570 are nearly monomict breccias with clasts components of rapidly cooled materials and minor slowly cooled pyroxenes (e.g., Juvinas-type). Y-82202 is a monomict breccia penetrated by glassy shock melt veins. It is suggested that the polished thin sections of the 5 eucrites presently available belong to a single suite which contains mostly quickly cooled varieties of eucrites similar to those in Pasamonte or in the Y-74159-type polymict eucrites. On the basis of the geological setting of HED parent body, it is concluded that these eucrites may have been located in the shallow ejecta blanket of the HED-parent body, judging from the high mixing ratio of unequilibrated clasts and low degree of equilibrium of pyroxene. (Auth. mod.)

E-47195
Matsunami, S., **Silica phase as thermoluminescence phosphor in ALH-77214 (L3.4) chondrite,** NIPR Symposium on Antarctic Meteorites, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1992, p.270-280, 16 refs.

The induced thermoluminescence (TL) images for a slice sample of ALH-77214 (L3.4) have been measured to examine TL phosphors in type 3 ordinary chondrites with low TL sensitivity, using a TL spatial distribution readout system combined with microscope. The chemical compositions of TL phosphors were analyzed by X-ray microanalyzer. The TL emissions due to silica phases have been newly observed in 2 pyroxene chondrules with silica inclusions, and one porphyritic olivine chondrule with very silica-rich mesostasis, in addition to those due to feldspar crystals formed in chondrule mesostases enriched in plagioclase component. The glow curves of the silica phases are quite different from those of the usual chondrule mesostases. Glow curves of induced TL were utilized for 5 silica phases (hydrothermal quartz, volcanic quartz, tridymite, cristobalite and silica glass). From similarities of the shape of the glow curve, the silica phase was tentatively identified to be cristobalite. By using silica phases as a common TL phosphor, a comparative study can be made of TL characteristics among chondritic meteorites. (Auth.)

E-47196
Ninagawa, K., **Thermoluminescence of chondrules in primitive ordinary chondrites, Semarkona and Bishunpur,** NIPR Symposium on Antarctic Meteorites, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1992, p.281-289, 12 refs.

The spatial distribution of the induced thermoluminescence (TL) and TL glow curves of the primitive ordinary chondrites Semarkona (LL3.0) and Bishunpur (LL3.1) were investigated over a wide range of wavelengths using a TL spatial distribution readout system. Although bulk samples of Semarkona and Bishunpur have TL sensitivity lower than ALH-77214 (L3.4), individual chondrules show a wide variety of induced TL intensity and glow curve shape. Chondrules with anorthite-normative mesostases have especially high induced TL intensity, and their TL is produced at wavelengths >480 nm, compared with <480 nm for the sensitivity range of the usual TL measuring systems. Some of the metamorphism-dependent TL sensitivity of type 3 ordinary chondrite therefore results in changes in the spectrum of the light produced. (Auth.)

E-47197
Fujimaki, H., Ishikawa, K., Aoki, K., **Rb-Sr features of the impact-melted LL-chondrites from Antarctica: Yamato-790723 and Yamato-790528,** NIPR Symposium on Antarctic Meteorites, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1992, p.290-297, 16 refs.

Rubidium and strontium abundances as well as Sr isotopic compositions were analyzed for the impact-melted meteorites (LL-chondrite: Yamato-790723 and -790528) from Antarctica to clarify their Rb-Sr features and to date the impact events. The samples were separated according to magnetic property. The less magnetic and glass-rich portions of Y-790723 approximate an isochron of 1.27 +/- 0.19 Ga. The obtained age should indicate the impact event. The magnetic portions and fine-grained one largely deviate from the isochron. Y-790528 is rather depleted in K2O and Rb, but not in Na2O; this may be due to scarcity of the K-rich fragments. The Sr-87/Sr-86 ratios of the separated portions from Y-790528 are low and less variable. The five less magnetic portions of the Y-790528 chondrite seem to form the isochron of 4.36 +/- 0.76 Ga as the time of the impact event. The large errors may have derived from local reset of the Rb-Sr chronometer and incomplete separation into the portions. (Auth.)

E-47198
Miura, Y., Nagao, K., **Noble gases and Kr-81/Kr exposure ages of non-antarctic ordinary chondrites: an attempt to measure terrestrial ages of antarctic meteorites,** NIPR Symposium on Antarctic Meteorites, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1992, p.298-309, 26 refs.

Cosmogenic Kr-81 and other noble gases of 3 ordinary chondrites, Long Island (L6), Densmore (1950) (H6), and Gladstone (stone) (H6), have been measured with the mass spectrometer newly installed in 1989 to examine the analytical accuracy using the production rates of cosmogenic noble gases proposed by Eugster. For Long Island and Densmore, the Kr-81/Kr ages are 16 +/- 2 Ma and 7.7 +/- 0.5 Ma, respectively, and are in agreement with the ages by Ne-21 and Kr-83, which indicates the validity of both Kr-81 analysis and the production rates P21 and P83 used in this work. Cosmogenic He-3 contents in these meteorites are lower than those expected from the production rate P3, which might be caused by partial loss of He. The ages T38 based on Ar-38 and P38 were shorter than the ages T21 and T81. This may be due to the unreasonably high Ar-38 production rates calculated for these meteorites. The constant production rate of cosmogenic Ar-38 indicates a better internal concordance than that as a function of shielding depth proposed by Eugster. Gladstone is a gas-rich meteorite, in which the abundant solar noble gases made it difficult to estimate the cosmogenic noble gas concentrations, and the resulting ages have large uncertainties. (Auth. mod.)

E-47204
Anderson, J.B., **USAP 1991 marine geology-geophysics cruise report and R/V *Polar Duke* equipment status. Preliminary results of high resolution seismic and coring surveys in the Antarctic Peninsula region,** 1991, 10 leaves.

The USAP 91 cruise began on Jan. 8, 1991 in Punta Arenas, Chile. Scientific work began one week later in the Antarctic Peninsula region. Scientific objectives included the following: acquire a high resolution seismic reflection data set in the northwestern Weddell Sea suitable for seismic stratigraphic analysis to use in the examination of the Neogene glaciation record on the shelf, and to aid in the selection of future drilling sites to further assist in this examination; collect high resolution seismic profiles from the northern Antarctic Peninsula continental shelf to map those features which define the grounding line position of the late Wisconsinan ice cap in the region; and acquire piston cores and high resolution seismic records from Herbert Sound and Maxwell Bay to enhance understanding of the Holocene glacial/climatic record of the Antarctic Peninsula region.

E-47209
DeHart, J.M., **Chemical and physical studies of chondrites: X. Cathodoluminescence and phase composition studies of metamorphism and nebular processes in chondrules of type 3 ordinary chondrites,** *Geochimica et cosmochimica acta,* Oct. 1992 56(10), p.3791-3807, 79 refs.

The cathodoluminescence (CL) properties of eight type 3 ordinary chondrites and one L5 chondrite have been determined, and phenocryst and mesostasis compositions have been analyzed in the chondrules of four of them (Semarkona, type 3.0; Krymka, 3.1; Allan Hills A77214, 3.5; and Dhajala, 3.8) in order to investigate their origins and metamorphic history. Two major classes of chondrule with eight subdivisions have been identified mainly on the basis of CL properties, and >95% of the chondrules can be assigned to these groups on the basis of phenocryst and mesostasis composition. Class A chondrules, consisting of those with plagioclase-normative mesostasis with bright CL, are subdivided into groups A1, A2, A3, A4, and A5. Class B chondrules, with little or no CL and having quartz-normative mesostases in the least metamorphosed chondrites which becomes feldspathic with metamorphism, are subdivided into groups B1, B2, and B3. Relationships between the eight chondrule groups can be deduced from their relative abundance in each of the nine chondrites. Groups A1, A2, B1, and A5 are present in Semarkona (15, 20, 60, 5% by number, respectively), group A5 chondrules in Semarkona being more heterogeneous than A5 chondrules in chondrites of higher petrologic type. Chondrule group A1 evolves into A3 then A4 and then A5 during metamorphism while A2 evolves into A4 and then A5. Chondrule group B1 evolves into B2, B3, and then A5 but higher levels of metamorphism are required to complete the series than for the A1-5 series. Conversion of a group to an adjacent group can be observed in Allan Hills A77214 (3.5), where several chondrules are group B3 in their central regions and group A5 in their outer regions. The present chondrule groups are essentially independent of texture. Since group A and group B chondrules differ in bulk composition, redox state, and possibly oxygen isotope systematics, their relative abundance might be a factor in the creation of the nine chondrite classes. (Auth.)

E-47234

Eraso, A., **Mineralogic and microsonde analysis of volcanic ash in the vicinity of Juan Carlos I Station** [Analisis mineralógico y por microsonda de las cenizas volcánicas existentes junto a la Base Antártica Española Juan Carlos I. Isla Livingston, Shetland del Sur], Spain. Proyecto Español de Glaciología Antártica. Contribución a la Campaña Antártica 88/89. Primeros resultados. (Contribution to the Antarctic Expedition 1988-1989. First results), [Madrid], E.T.S.I. Minas: Universidad Politecnica de Madrid, [1989], p.80-88, In Spanish with English summary. 6 refs.

DLC GB2597.C86

Results are presented of analyses of volcanic ash samples from 3 different sources: the underground drainage of the Cazadora Glacier, interlaid in the fossil beach levels where the Juan Carlos I Station is located, and lying openly on bare slopes. The degree was determined of the alteration of volcanic glasses, converted into clay minerals, by X ray diffraction, granulometry of thin sections, and electron microscopy. Analogies and differences between clay types are discussed. (Auth. mod.)

E-47236

Ishman, E.I., Webb, P.N., **Late Neogene benthic foraminifera from the Victoria Land Basin margin, Antarctica: application to glacio-eustatic and tectonic events,** *Revue de paléobiologie,* Mar. 1988 Special issue No.2, Benthos '86, 22-28 septembre 1986: Troisieme symposium international sur les foraminiferes benthiques (Benthos '86, Sep. 22-28 1986: Third international symposium on benthic foraminifera), p.523-551, 97 refs.

DLC QE772.I55

The most complete sequence of Late Miocene-early Pliocene glacio-marine sediments in the Victoria Land Basin is represented in core material collected at Dry Valley Drilling Project (DVDP) Sites 10 and 11 in Taylor Valley. The presence of *in-situ* marine faunas and floras indicate marine inundation and suggests Taylor Valley was a Late Neogene fjord. DVDP 10 and 11 sediments provide a detailed record of near-shore transitional facies and interaction between east antarctic outlet glaciers and marine waters from the Ross Sea. Late Cenozoic uplift of the Transantarctic Mountains prevented destruction of this record by the Quaternary Ross Ice Shelf glaciations that advanced across and grounded on the continental shelf. Late Neogene Taylor fjord sediments yield a well-preserved and diverse foraminiferal fauna of 43 genera (88 species). The fauna is dominated by calcareous benthic taxa; no agglutinated forms are present and only 3 planktonic species occur. A biostratigraphic zonation erected for the Late Neogene sequences of DVDP 10 and 11 includes four assemblage zones and intermittent interval zones (zones barren of foraminifera). *Epistominella vitrea* is the dominant species found throughout DVDP 10 and 11. The occurrence of *Trochoelphidiella uniforamina* and planktonics *Streptochilus latum* and *Neogloboquadrina pachyderma* provide a maximum age datum of late Miocene (>7 m.y.) for the lowermost section of DVDP 10 and 11. Due to the low diversity and poor distribution of planktonic foraminifera, additional dating of these sediments is based on diatom biostratigraphy. (Auth. mod.)

E-47237

Webb, P.N., **Upper Oligocene-Holocene benthic foraminifera of the Ross Sea region,** *Revue de paléobiologie,* Mar. 1988 Special issue No.2, Benthos '86, 22-28 septembre 1986: Troisieme symposium international sur les foraminiferes benthiques (Benthos '86, Sep. 22-28 1986: Third international symposium on benthic foraminifera), p.589-603, Refs. p.601-603.

DLC QE772.I55

The Ross Sea and Transantarctic Mountains valley marine basins provide one of the more complete Upper Cenozoic stratigraphic records in Antarctica. These basins were subject to the influences of a fluctuating terrestrial glacial environment on the adjacent antarctic continent from at least the Late Oligocene (about 30 Ma). Through this time interval three major benthic foraminiferal divisions are recognized: a Late Paleogene-Early Neogene temperate latitude immigrant element; a Neogene polar shelf element; and a polar shelf element with strong affinities to antarctic shelf assemblages of the present day Ross Sea region. The three groups are intermixed to varying degrees in the Late Oligocene and Early Miocene, with a gradual replacement of the temperate immigrant group by colder water assemblages as polar conditions expanded across the Ross Sea basins. Polar assemblages exhibit notable stability at both the generic and species level over the past 30 Ma. There are few significant levels of concentrated first and last appearances during this span of time. Changes in benthic assemblages generally involve subtle population reorganization, a response to changing marine glacial and interglacial conditions. Dominant taxa in these Upper Oligocene-Holocene polar assemblages also dominate coeval circum-antarctic deep sea assemblages. However, many secondary taxa are regionally restricted, leading to a strong distinction between polar shelf and abyssal faunas through time. (Auth. mod.)

E-47268

Hall, K.J., **Mechanical weathering in the Antarctic: a maritime perspective,** Binghamton Symposium in Geomorphology, 22nd, Buffalo, NY, Sep. 1991. Proceedings. Periglacial geomorphology. Edited by J.C. Dixon and A.D. Abrahams, Chichester, England, John Wiley and Sons, 1992, p.103-123, 64 refs.

Considerations of mechanical weathering in the Antarctic are usually limited to the continent and to the dry valleys in particular. However, the oft-unrecognized maritime antarctic differs climatically from the continent, particularly in terms of moisture availability, and consequently experiences a markedly different weathering regime. Data are presented on mechanical weathering processes, with special emphasis on freeze-thaw, from a maritime antarctic location. The interrelationship of the various weathering mechanisms is shown and the manner in which those factors controlling freeze-thaw can exert an influence on other processes is demonstrated. For the first time an attempt is made to integrate a combination of field and simulation data to deduce the actual freeze-thaw mechanism causing rock breakdown. It is shown that, compared to the continent, despite the potentially more dynamic maritime weathering environment, weathering rates are still slow. (Auth.)

E-47269

Ricou, L.E., Besse, J., Marcoux, J., Patriat, P., **Gondwanian fit that complies with multidisciplinary constraints** [Une reconstruction du Gondwana révisée à partir de données pluridisciplinaires], *Académie des sciences, Paris. Comptes rendus. Série II,* Aug. 16, 1990 311(4), p.463-469, In French with abridged English version. 28 refs.

Currently presented reconstructions of Gondwana derive from Du Toit and fit India with Antarctica. However, present geological knowledge necessitates an India-Antarctica fit but this did not lead to a complete solution which could avoid a questionable oceanic gap within the megacontinent. A solution is proposed which is based upon the geological and paleomagnetic data, is consistent with recent oceanic data, and accounts for the major fault zone which splits Antarctica into two parts. (Auth.)

E-47271

Leyrit, H., **Jeanne d'Arc and Ronarc'h peninsulas: an experimental area for a Kerguelen geological map** [Les presqu'îles Jeanne d'Arc et Ronarc'h: zone-test pour une cartographie géologique au 1/100,000 des îles Kerguelen], *Académie des sciences, Paris. Comptes rendus. Série II,* Aug. 30, 1990 311(5), p.561-566, In French with abridged English version. 20 refs.

The Jeanne d'Arc and Ronarc'h peninsulas of the Kerguelen Archipelago consist of differentiated alkaline basalts. This basaltic pile overlaps older basalts that are present everywhere on the Archipelago. In this peripheric volcanism intruded by plutons, two successive magmatic units are separated by river or marine sediments, laid down during a long period without any igneous activity. A local tectonic is specified. (Auth.)

E-47273

Rinaldi, C.A., ed, **Geology of James Ross Island** [Geología de la isla James Ross], Buenos Aires, Dirección Nacional del Antártico, 1992, 389p., In Spanish. Refs. passim. For individual papers see C-47285, E-47274 through E-47284 and E-47286 through E-47289.

This is a collection of reports on the stratigraphy, biostratigraphy, paleontology, sedimentology and tectonics of James Ross I., the results of a 15-year research program, Geoantar, of the Argentine Institute of Antarctic Research. All papers are presented in Spanish, of which 11 have English summaries and 5 have full English translations.

E-47274

Strelin, J., Malagnino, E.C., **Geomorphology of James Ross Island** [Geomorfología de la isla James Ross], Geología de la isla James Ross (Geology of James Ross I.). Edited by C.A. Rinaldi, Buenos Aires, Dirección Nacional del Antártico, 1992, p.7-36, In Spanish with English summary. 25 refs.

The main geomorphologic features of James Ross I. are the results of glacial processes and on this basis the island is divided into two sectors: one related to the Mount Haddington Ice Cap and the other to a more restricted glaciation. The first sector is characterized by a pattern of ice flow that moves radially from the Haddington and Dalinger ice domes. The James Ross I. glaciers are classified as of the subpolar type, with partial superficial thawing at high altitudes and partial basal thawing at low altitudes. During glacial and interglacial periods several marine terraces were formed as a consequence of glacieustatic and combined tectonic movements. A minimum of seven marine terraces were located at altitudes of 0.75-1 m; 2-3 m; 4-6 m; 10-14 m; 20-22 m; 30-40 m; and 100 m. Other flat surfaces that could have a similar origin were found at altitudes of 140-300 and 550-600 m. James Ross I. has been traditionally considered as consisting of a single Plio-Pleistocene volcanic cone. However, very Recent volcanic activity was also detected at the eastern margin of the island. This younger volcanic activity consists of three post-glacial maar craters that preserve the record of two superimposed volcanic activities. The initial vulcanism is of hydroclastic type and the latter is pyroclastic; the products of both volcanic activities are of olivine-basaltic composition. The study of the volcaniclastic sequence and of the younger deposits allowed for a summarized reconstruction of events. (Auth. mod.)

E-47275

Medina, F.A., Buatois, L.A., **Aptian-Campanian (Upper Cretaceous) biostratigraphy of James Ross Island** [Bioestratigrafía del Aptiano-Campaniano (Cretácico superior) en la isla James Ross], Geología de la isla James Ross (Geology of James Ross I.). Edited by C.A. Rinaldi, Buenos Aires, Dirección Nacional del Antártico, 1992, p.37-45, In Spanish with English summary. 29 refs.

Twelve invertebrate marine assemblages have been recognized within the strata on the NW coast of James Ross I., and are assigned to the Upper Aptian-Upper Santonian/Lower Campanian. They are, from base to top: *Australiceras* Assemblage Zone, *Peltocrioceras* Assemblage Zone, *Ptychoceras* Assemblage Zone, *Anopaea* Assemblage Zone, *Tetragonites* Faunule, *Mariella* Assemblage Zone, *Hypoturrilites* Faunule, *Calycoceras* Assemblage Zone, *Scaphites* Faunule, *Hyphantoceras* Faunule, *Peroniceras* Faunule and *Madagascarites* Faunule. (Auth.)

E-47276

Olivero, E.B., **Late Cretaceous ammonite assemblages of the Santa Marta Formation, James Ross Island** [Asociaciones de amonites de la Formación Santa Marta (Cretácico tardío), isla James Ross, Antártida], Geología de la isla James Ross (Geology of James Ross I.). Edited by C.A. Rinaldi, Buenos Aires, Dirección Nacional del Antártico, 1992, p.47-75, In Spanish with English summary. Refs. p.58-61.

New evidence is presented allowing for a better understanding of the relative stratigraphic position of the ammonite localities of the northwestern part of James Ross I. (Santa Marta Formation) and those of the eastern Snow Hill and Seymour islands (López de Bertodano Formation). A detailed survey of the Alpha, Beta, and Gamma members of the Santa Marta Formation carried out in the field seasons of 1975, 1986, 1988, 1989, and 1990 has resulted in the collection of more than 3000 ammonite specimens in about 50 fossiliferous localities distributed in 18 sections. The ammonites of the Santa Marta Formation are informally divided into 8 faunas, including: *Baculites* aff. *kirki* Assemblage; *Natalites rossensis* Assemblage; *Natalites* spp. 1 Assemblage; *Grossouvrites occultus-Maorites* sp. Assemblage; *Neograhamites* aff. *morenoi-"N". taylori* Assemblage; *Karapadites* aff. *centinelaensis-Natalites* spp. 2 Assemblage; *Neograhamites* sp. Assemblage; and a youngest Upper Assemblage dominated by *Neograhamites* aff. *kiliani* and *Gunnarites* spp. (Auth. mod.)

E-47277

Marenssi, S.A., **Upper Cretaceous of southeastern James Ross Island** [El Cretácico superior del sudeste de la isla James Ross, Antártida], Geología de la isla James Ross (Geology of James Ross I.). Edited by C.A. Rinaldi, Buenos Aires, Dirección Nacional del Antártico, 1992, p.77-99, In Spanish and English. 22 refs.

Outcrops of Cretaceous marine sediments at southeastern James Ross I. between Ekelöf Point and Cape Foster have been revised. The first integrated results of such revision are presented here. Two lithostratigraphic units (Rabot and López de Bertodano formations) can be recognized. They have a minimum thickness of 850 m and form the middle part of the Marambio Group (Upper Cretaceous-Lower Tertiary). A Late Campanian age can be assigned to these sedimentites on the basis of the fossil fauna. The Rabot Formation crops out at Rabot Point, northwestern Cape Hamilton, Redondo Point and the west of Cape Foster. This unit represents the base of the local sequence and is made up of sandstones, mudstones and scarce conglomerates. On the base of lithologic and faunal criteria, 3 informal members could be recognized; each one mirrors different situations during deposition on a storm-influenced marine shelf. The López de Bertodano Formation is stratigraphically above the Rabot Formation and crops out at Cape Hamilton and Ekelöf Point. The lithology is composed of sandy siltstone to fine silty sandstones with scarce claystone beds in the lower part and fine sandstones at the top of the sequence. In spite of the very poor invertebrate fauna recorded in these sedimentites, they are quite different from those collected in the Rabot Formation. The López de Bertodano sedimentites were deposited in a low-energy marine shelf environment. (Auth.)

E-47278

Martinioni, D.R., **Late Cretaceous Rabot Formation, James Ross Island** [La Formación Rabot (Cretácico superior, isla James Ross, Antártida): un ciclo transgresivo-regresivo de plataforma con dominio de procesos de tormenta], Geología de la isla James Ross (Geology of James Ross I.). Edited by C.A. Rinaldi, Buenos Aires, Dirección Nacional del Antártico, 1992, p.101-123, In Spanish with English summary. 37 refs.

Approximately 350 m of Upper Cretaceous sedimentites are exposed at Rabot Point, James Ross I. The sedimentary succession is included in the Rabot Formation, which is divided into three informal members: I, II, and III. The lower part of Member I is not exposed, and the upper part of Member III is unconformably overlain by the James Ross I. Volcanic Group. This paper deals with a detailed sedimentological study of the Rabot Formation at its type locality. The results are shown in progressively higher scales of analysis, including the description of single facies (beds); the analysis of facies associations; and the interpretation of the vertical distribution of different facies associations. The analysis in the first hierarchical level (strata) is related to sedimentary processes that generated the lithofacies; the following level (association) lays a special emphasis on sedimentary environments in which deposition took place; and the highest level (association distribution) concerns the evolution of the depositional system. Ten lithofacies were identified in the Rabot Formation: coarse conglomerates, laminated and/or massive burrowed sandstones, wave ripple cross-laminated sandstones, fine sandstones with hummocky cross-stratification, lens-like conglomerates and sandstones, cross-stratified sandstones, mudstone, claystone, laminated limestones and tuff. (Auth. mod.)

E-47279

Olivero, E.B., Martinioni, D.R., Mussel, F.J., **Upper Cretaceous sedimentology and biostratigraphy of western Cape Lamb, Vega Island** [Sedimentología y bioestratigrafía del Cretácico superior del oeste de cabo Lamb (isla Vega, Antártida). Implicancias sobre ciclos sedimentarios u evolución de la cuenca], Geología de la isla James Ross (Geology of James Ross I.). Edited by C.A. Rinaldi, Buenos Aires, Dirección Nacional del Antártico, 1992, p.125-166, In Spanish and English. 51 refs.

A detailed analysis of two sedimentary logs, comprising a composite section of 250 m in thickness on western Cape Lamb, Vega I., has resulted in the recognition of 4 siliciclastic facies: silty sandstone and sandstone (Facies A); pebbled silty sandstone (Facies B); mudstone (Facies C); and conglomerates (Facies D). The fine-grained facies are interpreted as deposited from suspension, in part with subsequent winnowing or reworking of the finest particles (Facies A). Finer particles of Facies B resulted from the same depositional processes, but their coarser elements were probably introduced by organic rafting. Facies D is interpreted in part as a concentration of lag gravel from Facies B and in part as a transgressive lag deposit. Lenses of laminated limestones could form an additional facies, (E) but their origin is not clear (biogenic or diagenetic deposits). The distribution of facies associations and body and trace fossil assemblages allows for the recognition of two sequences. Comparison of the sedimentary cycles recognized on Vega I. with other age-equivalent deposits on James Ross, Humps, Snow Hill, and Seymour islands bears important implications for the paleogeography and pattern of basin fill. On this basis it is recognized that during the Late Cretaceous the western, landward side of the basin was a site of both reduced subsidence and sedimentation, while the eastern, seaward part of the basin was characterized by deposition of thick sedimentary sequences and by a relatively high subsidence rate. (Auth. mod.)

E-47280

Medina, F.A., Buatois, L.A., Lopez Angriman, A., **Stratigraphy of the Gustav Group on James Ross Island** [Estratigrafía del Grupo Gustav en la isla James Ross, Antártida], Geología de la isla James Ross (Geology of James Ross I.). Edited by C.A. Rinaldi, Buenos Aires, Dirección Nacional del Antártico, 1992, p.167-192, In Spanish with English summary. 22 refs.

The Cretaceous deposits of the Gustav Group are exposed in the occidental part of James Ross I., forming a belt of about 50 km in length. The geologic units, from base to top are: Lagelius Point Formation, Kotick Point Formation, Unnominated Strata, Whisky Bay Formation and Hidden Lake Formation. A review of previous stratigraphic studies has revealed several inaccuracies and incongruities which are discussed in the light of recent research. The Group is characterized by thick sequences of conglomerates, breccias, sandstones and mudstones that show marked lateral and vertical facies variations. Detailed stratigraphy of the measured sections and paleontological studies indicate that the age of this Group ranges from Barremanian-Aptian to Coniacian-Santonian. (Auth.)

E-47281

Medina, F.A., Buatois, L.A., Strelin, J., Martino, E., **Fauna of Cabo Polanski, James Ross Island** [La fauna de cabo Polanski, isla James Ross], Geología de la isla James Ross (Geology of James Ross I.). Edited by C.A. Rinaldi, Buenos Aires, Dirección Nacional del Antártico, 1992, p.193-199, In Spanish with English summary. 24 refs.

A siltstone and sandstone sequence exposed at Cape Polanski is informally named "Cabo Polanski beds". Mollusca collected *in situ* indicate a Late Cretaceous age. The presence of *Gaudryceras* sp., *Eubostrychoceras* sp. and *Ryugasella antarctica* Olivero points more specifically to a Late Santonian-Early Campanian age. (Auth.)

E-47282

Strelin, J., Scasso, R.A., Olivero, E.B., **New localities of Late Cretaceous outcrops of the Santa Marta Formation on James Ross Island** [Nuevos afloramientos de la Formación Santa Marta (Cretácico tardío) en la isla James Ross, Antártida. Estratigrafía e implicancias estructurales], Geología de la isla James Ross (Geology of James Ross I.). Edited by C.A. Rinaldi, Buenos Aires, Dirección Nacional del Antártico, 1992, p.201-237, In Spanish and English. 24 refs.

The discovery of several new localities of Upper Cretaceous outcrops in the Croft Bay area (James Ross I.) bears important implications for the local stratigraphy and reveals a regional structure that has a major significance for the Cretaceous basin. On the basis of the lithology and megafauna content, the Cretaceous sequences of Massey Heights, Lagunitas Mesa, Martino Point, Dobson Dome, Dreadnought Point, Sin Nombre Creek, Ventisca Nunatak, Laguna Jessica, and Cape Polanski are correlated with members and facial groups of the Santa Marta Formation at its type section. Of particular interest is the fact that part of the sedimentary sequence of Dreadnought Point can be correlated with the Beta Member of the Santa Marta Formation. This correlation indicates a major stratigraphic repetition that suggests that the Dreadnought area has been uplifted by the order of 600 m. In addition, the position of the beds in Croft Bay area departs markedly from the regional Cretaceous structure. It is interpreted that the boundary of the area associated with these anomalous structural features is defined by a major fault zone which is called here the Dreadnought Belt. (Auth.)

E-47283

Buatois, L.A., Lopez Angriman, A., **Trace fossils from the Cretaceous Gustav Group, James Ross Island** [Trazas fósiles y sistemas deposicionales del Grupo Gustav, Cretácico de la isla James Ross, Antártida], Geología de la isla James Ross (Geology of James Ross I.). Edited by C.A. Rinaldi, Buenos Aires, Dirección Nacional del Antártico, 1992, p.239-262, In Spanish with English summary. Refs. p.249-252.

Trace fossils from the Cretaceous Gustav Group are analyzed in order to establish their environmental significance and relationship with the identified depositional systems. The distribution of trace fossil assemblages was controlled by local parameters, such as energy, substrate, oxygenation, food supply and salinity. Trace fossils are scarce in the coarse-grained deposits of the first submarine braided channel depositional system. Minor channels in marginal terraces and proximal plains of the second submarine braided channel depositional system hosted a Domichnia-dominated trace fossil assemblage. This shallow water assemblage reflects local parameters. A Fodinichnia-dominated trace fossil assemblage is present in the interchannel areas. Dwelling structures of suspension-feeders *(Thalassinoides, Skolithos, Palaeophycus)* are present in front delta deposits of the fan delta depositional system, suggesting high wave energy. The majority of biogenic structures in the distributary plain are found in the sandstone-fill distributary channels. From base to top within a channel, *Thalassinoides suevicus, Planolites, Palaeophycus,* contorted feeding structures and small straight burrows are present. Trace fossils from the shallow-water marine depositional system are typical from the *Cruziana* ichnofacies. *Teredolites* distribution throughout the sequence suggests that this particular type of bivalve tracemaker was esthenohalyne. (Auth. mod.)

E-47284

Buatois, L.A., Lopez Angriman, A.O., **Evolution of Cretaceous depositional systems in the Gustav Group of James Ross Island** [Evolución de sistemas deposicionales en el Grupo Gustav,Cretácico de la isla James Ross, Antártida], Geología de la isla James Ross (Geology of James Ross I.). Edited by C.A. Rinaldi, Buenos Aires, Dirección Nacional del Antártico, 1992, p.263-297, In Spanish with English summary. Refs. p.277-281.

Cretaceous strata from the Gustav Group exposed at the northwest part of James Ross I. are interpreted as the result of five depositional systems: a submarine braided channel depositional system is represented by the Barremian Lagrelius Point Formation; the exposed sequence represents the infill of a major braided channel followed by deposition in a series of minor channels. A fault-controlled slope depositional system is envisaged for the Kotick Point Formation (Aptian-Late Albian); sand lobe, channel, open slope and coarse-grained slope foot wedge deposits were identified. A second submarine braided channel depositional system is represented by the Whisky Bay Formation (Late Albian-Coniancian); major and minor channel, marginal terrace, proximal sandy plain and interchannel deposits are present; a wide suite of sediment gravity flows were the dominant processes operative in this turbidite system. A fan-delta depositional system is interpreted for the lower and middle part of the Hidden Lake Formation (Coniacian-Santonian); delta front deposits mainly consist of gravelly and sandy wave-reworked mouth bars; braidplain sandflat, braidplain channel-fill sandstone and conglomerate, and floodplain deposits are present in the distributary plain. During the Santonian, a transgression gave place to the shallow-marine depositional system recorded in the upper part of the Hidden Lake Formation. The Gustav Group is interpreted as a regressive megasequence from deeper basal to shallow marine deposits at the top. (Auth. mod.)

E-47286

Del Valle, R., Diaz, M.T., Febrer, J.M., Keller, M., **Seismic study on James Ross Island** [Estudio sísmico en la isla James Ross], Geología de la isla James Ross (Geology of James Ross I.). Edited by C.A. Rinaldi, Buenos Aires, Dirección Nacional del Antártico, 1992, p.315-322, In Spanish with English summary. 15 refs.

Seismic reflection studies carried out on James Ross I. during the 1987/88 and 1988/89 seasons are reported. Two areas presenting the most favorable possible surface conditions were chosen. Two seismic parallel lines of 7 and 8 km length, running nearly 45 km apart, were located to the NW and SE sides of the island, respectively. Interpretation gave evidence of several reflecting levels and permitted an estimate of the total thickness of sedimentary coverage. The general trend of the basin is a SE dipping, where a maximum total thickness of 6900 m was calculated. The main features are found to be similar in both seismic lines. This fact supports the historical tectonic hypothesis proposed for this basin. (Auth. mod.)

E-47287

Nuñez, J., Vilas, J.F., Diaz, T., **Paleomagnetism in sedimentary rocks of James Ross Island** [Paleomagnetismo en rocas sedimentarias de la isla James Ross, Antártida Argentina], Geología de la isla James Ross (Geology of James Ross I.). Edited by C.A. Rinaldi, Buenos Aires, Dirección Nacional del Antártico, 1992, p.323-338, In Spanish and English. 9 refs.

Results of palaeomagnetic studies carried out on 5 samples of sedimentites from James Ross I. are given. Four of these samples belong to Lower Kotick Point Formation and the remainder to Hidden Lake Formation. Taking into consideration the age assigned to the rocks, by palaeontological studies and according to the values obtained through the analysis of the residual magnetism, the 4 samples collected at Lower Kotick Point Formation are situated at the Aptian-Albian limit, while the specimen corresponding to Hidden Lake Formation is of Campanian age. The 5 samples underwent tests of magnetic stability through progressive warming, carried out in stages. This permitted the isolation of the stable residual magnetism (SRM). On the basis of the SRM, the corresponding virtual geomagnetic poles were situated at a distance of about 35 deg from the palaeomagnetic poles of the Andean Intrusive Series (for the Late Cretaceous). This fact could reflect transitional changes of direction of the Earth's magnetic field, or the different positions between the Antarctic Continent and the geographic pole in the Cretaceous. (Auth. mod.)

E-47288

Del Valle, R.A., Rinaldi, C.A., **Structural features of northeastern Antarctic Peninsula and of James Ross Island** [Esquema regional de los principales lineamientos estructurales del extremo nororiental de la península Antártica y del area de la isla James Ross], Geología de la isla James Ross (Geology of James Ross I.). Edited by C.A. Rinaldi, Buenos Aires, Dirección Nacional del Antártico, 1992, p.339-358, In Spanish and English. 27 refs.

Results of a preliminary attempt to determine the regional structural features of the northeastern part of the Antarctic Peninsula and the James Ross I. area, combining topographic maps, aerial photographs, satellite imagery and geological as well as geophysical surveys, are presented. Four major fracture zones of NNW orientation have been observed in the study area. These fracture zones, which are transversal to the axis of the Mesozoic folding of the Antarctic Peninsula metamorphic basement, divide the northern part of the peninsula into at least 4 main large tectonic segments. These tectonic segments are in turn divided into minor blocks, which are mainly bounded by longitudinal (EW and ESE) and diagonal (NW and NE) fault systems. James Ross and Vega islands also present a block structure more complex than that shown by the Antarctic Peninsula. In essence, the same basic major systems of block-forming faults, which are overlaid by younger and/or secondary structures, are present. (Auth. mod.)

E-47289

Baldoni, A., **Palynology of the Santa Marta Formation, Upper Cretaceous of James Ross Island** [Palinología de la Formación Santa Marta, Cretácico superior de la isla James Ross, Antártida], Geología de la isla James Ross (Geology of James Ross I.). Edited by C.A. Rinaldi, Buenos Aires, Dirección Nacional del Antártico, 1992, p.359-374, In Spanish with English summary. 15 refs.

Ninety-eight species of pollen and spores, as well as mushroom spores, algae and cuticula remains were recognized in a study carried out on samples from James Ross I. The pollen diagram obtained shows the percentage content in pollen grains and spores over the studied profile (1200 m thick), and the microplankton changes according to the advance or retreat of the sea. Certain features concerning the environmental characteristics of this sector can be inferred from the examination of the main microflora groups. The studies carried out confirm the age based on the microfauna (Santonian-Campanian-Maastrichtian) previously established. (Auth. mod.)

E-47293

Foster, D.A., Gleadow, A.J.W., **Reactivated tectonic boundaries and implications for the reconstruction of southeastern Australia and northern Victoria Land, Antarctica,** *Geology,* Mar. 1992 20(3), p.267-270, 26 refs.

Rifted continental margins are strongly influenced by the location of zones of preexisting crustal weakness. Apatite fission-track thermochronological data indicate that the Paleozoic lithospheric boundary between the Kanmantoo and Lachland fold belts in western Victoria, Australia, was reactivated during Mesozoic rifting as a transfer fault. To the east of this boundary, 1-2 km of material was denuded during extension, while essentially no denudation took place during rifting to the west. The correlated tectonic boundary within the Bowers terrane of northern Victoria Land was also reactivated upon rifting. During fragmentation of Gondwana, movement on this zone perpendicular to the direction of rifting probably determined the location of the Tasman Fracture Zone. When Australia and Antarctica are reconstructed along the trace of the Tasman Fracture Zone, the tectonic boundary in Victoria falls into precise alignment with the Bowers terrane. (Auth.)

E-47299

Stilwell, J.D., Zinsmeister, W.J., **Molluscan systematics and biostratigraphy: Lower Tertiary La Meseta Formation, Seymour Island, Antarctic Peninsula,** *American Geophysical Union. Antarctic research series,* Mar. 15, 1992 Vol.55, 192p., Refs. p.185-192.

DLC QE801.S792

The La Meseta Formation of Seymour I. contains one of the most diverse, well-preserved early Tertiary invertebrate faunas from the Southern Hemisphere. During the course of this study, which was based on 5 field seasons on Seymour I., 170 species of molluscs were collected from the nearshore sandstones and siltstones of the La Meseta Formation, which has been divided into 7 lithologic units (Telm1-Telm7). Faunal diversity is low in unit Telm5 and Telm6. This marked decline in diversity is believed to be a reflection either of local facies change or of the onset of rapidly decreasing sea surface temperatures in the southern oceans at the close of the Eocene. A fourfold biostratigraphic zonation *(Antarctodarwinella ellioti, Antarctodarwinella nordenskjöldi, Struthiolarella steinmanni,* and *Perissodonta laevis* zones) for the La Meseta Formation is proposed, based on changes within the gastropod family Struthiolariidae. The 170 species of molluscs recorded from the La Meseta Formation are based on more than 10,370 specimens of molluscs collected from 196 localities. Of the 123 new species that are described, 24 are bivalves and 98 are gastropods. In addition, one new species of scaphopod, 10 new genera, and three new subgenera are proposed. (Auth. mod.)

E-47305

Barrett, P.J., **Geochronological evidence supporting antarctic deglaciation three million years ago,** *Nature,* Oct. 29, 1992 359(6398), p.816-818, 31 refs.

The response of the antarctic ice sheets to increased global temperatures is an important unresolved issue in the assessment of future climate change. In particular, considerable controversy exists as to whether the east antarctic ice sheet suffered extensive deglaciation during the mid-Pliocene epoch (3 Myr ago), when temperatures were only sightly warmer than today. Although the ice sheet is widely assumed to have existed in something like its present form for the past 14 Myr, marine diatoms eroded from the antarctic interior have been bound in glacial till deposits high in the Transantarctic Mountains, and have been biostratigraphically dated about 3 Myr before present. This age has been disputed because it implies marine deposition in the antarctic interior, and hence substantial deglaciation, at the time when other evidence has been marshalled for the persistence of cold, polar conditions. Reported here are K-Ar and Ar-40/Ar-39 ages for a volcanic ash bed in diatom-bearing glaciomarine strata cored in Ferrar Fiord (East Antarctica) by the CIROS-2 drill-hole, which confirm the age of the diatoms at about 3 Myr, and hence also confirm the mid-Pliocene deglaciation. (Auth.)

E-47309

Wetzel, K., **Isotopic peculiarities of meteoric water in polar regions,** *Freiberger Forschungshefte. C,* 1990 Vol.442, Isotope und ihre Anwendung in den Geowissenschaften, in der Bergbausicherheit und im Umweltschutz: Vortrage des 4. Internationalen Isotopenkolloquiums 1988 in Freiberg, p.52-56, 9 refs.

DLC QE1.F73 Vol.442

Knowledge of isotopic peculiarities of meteoric water in polar regions is a precondition of the use of *delta*D and *delta*O-18 records in polar ice for paleoclimatic research. Therefore the slope m and the intersect q of the meteoric water line (*delta*D=*delta*O-18+q) have been studied in the typical climatic zones. As for the climatic zones of the Northern Hemisphere, the southern equatorial zone, and southern tropical zone and the southern equatorial zone, annual mean *delta* D and *delta*O-18 data of the IAEA/WMO precipitation network have been applied. According to antarctic data from Halley Station of this network, data published by various researchers have been investigated. The climatic zones have been selected such that they comprise at least 6 stations where precipitation has been sampled over a series of years. Results are summarized in a table. (Auth.)

E-47317
Crame, J.A., **Review—Late Cretaceous palaeoenvironments and biotas: an antarctic perspective,** *Antarctic science,* Dec. 1992 4(4), p.371-382, Refs. p.379-382.

The Cretaceous period is often regarded as one of "greenhouse" warmth, with perhaps its acme occurring in the late Albian stage (100 Ma ago). However, it is now apparent that, even at this time, there were significant meridional temperature gradients and distinct temperate biotas in the highest latitude regions. This is particularly so in the Southern Hemisphere, where an extensive Albian fossil record from Antarctica, Australia and New Zealand has revealed the presence of austral floras and faunas. With the recent improvements in stratigraphical correlations, it has become possible to trace the later Cretaceous palaeoenvironmental record in the Antarctic Peninsula region. By the Santonian-Campanian, high-latitude biotas are well developed in the James Ross I. region and their enhancement through the final stages of the Cretaceous can be linked to a phase of global cooling. The persistence of low diversity temperate communities in high latitude regions may be of considerable ecological and evolutionary significance. For example, there is evidence to suggest that these communities may have been more resistant to mass extinction events; they may also have been important source regions for replacement taxa that arose after such events. (Auth. mod.)

E-47328
Black, L.P., Sheraton, J.W., Tingey, R.J., McCulloch, M.T., **New U-Pb zircon ages from the Denman Glacier area, East Antarctica, and their significance for Gondwana reconstruction,** *Antarctic science,* Dec. 1992 4(4), p.447-460, Refs. p.459-460.

Two new U-Pb zircon ages from the area immediately west of Denman Glacier show that its geological history differs from that of the Obruchev Hills and Bunger Hills, to the east of the glacier. A crystallization age of 516.0 Ma for syenite is by far the youngest primary age reported for this region, whereas tonalitic orthogneiss from Cape Charcot, the oldest known local rock, was derived by the high-grade metamorphism and deformation at 2889 Ma of a 3003 igneous precursor. Both major populations of zircon in this rock lost Pb at 500-600 Ma. Although the Sm-Nd characteristics of the entire region resemble those of the Albany Mobile Belt of Western Australia, the Sm-Nd systematics of the felsic gneisses and plutonics are too old to allow direct correlation with the rocks of the Naturaliste Block (Western Australia), a potential key element for Gondwana reconstruction. However, the possibility exists that there is an indirect relationship between the Naturaliste Block and the region immediately west of Denman Glacier. (Auth.)

E-47329
Gazdzicki, A., **Stable carbon and oxygen isotope record in the Paleogene La Meseta Formation, Seymour Island, Antarctica,** *Antarctic science,* Dec. 1992 4(4), p.461-468, Refs. p.467-468.

Stable carbon and oxygen isotopic relations have been analyzed in brachiopod, gastropod, and bivalve fossils from the La Meseta Formation (Eocene-?early Oligocene), Seymour I. The results indicate a shift in *delta*C-13 by 6 per mill beginning in the middle part of the Unit II of the formation. This shift may imply a change from a largely stratified to a vigorously mixed ocean. Alternatively, the carbon isotopic shift may be regarded as reflecting a change in the local depositional environment. The oxygen isotopic curve does not decline parallel to the carbon curve and may thus imply a considerable climatic cooling event. This effect is so profound that it might be interpreted as evidence for glaciation, especially when taking into account the fact that this phenomenon coincides with the well-known cooling trend throughout the Eocene. If this interpretation is correct, the hypothesized glaciation may possibly be correlated with the Polonez Glaciation, the largest Cenozoic glaciation known in the Antarctic Peninsula sector. Alternatively, it may be regarded as a local phenomenon, predating development of the icesheet. (Auth. mod.)

E-47331
Del Valle, R.A., Elliot, D.H., Macdonald, D.I.M., **Sedimentary basins on the east flank of the Antarctic Peninsula: proposed nomenclature,** *Antarctic science,* Dec. 1992 4(4), p.477-478, 17 refs.

As the names Larsen, Marambio and James Ross are all in current use for sedimentary depocenters in the area, it is proposed that Larsen Basin be used to describe the Upper Mesozoic-Cenozoic sedimentary rocks that occur on the continental shelf east of the Antarctic Peninsula; its boundaries are mostly clearly defined. It is proposed that James Ross Basin be used for the northern sub- basin, including the James Ross I. area. The sub-basin includes most of the exposed rocks in the Larsen Basin and extends to the edge of the continental shelf. It is recommended that the term Weddell Basin be restricted to the ocean basin of the Weddell Sea. In particular, it should not be used for the continental shelf of the Antarctic Peninsula.

E-47351
Hambrey, M.J., Barrett, P.J., Ehrmann, W.U., Larsen, B., **Cenozoic sedimentary processes on the antarctic continental margin and the record from deep drilling,** *Zeitschrift für Geomorphologie,* Mar. 1992 Suppl.86, International Conference on Geomorphology: Geomorphology and Geoecology, 2nd, Frankfurt/Main, Germany, Aug. 30-Sep. 3, 1989. Proceedings, Vol.8. Glacial and polar geomorphology. Edited by G. Stäblein et al, p.77-103, With French summary. Refs. p.100-103.

Recent drilling on the antarctic continental shelf, combined with seismic surveys, has yielded not only a long-term record of glacial processes, but also evidence concerning the mode of build-up of the continental shelf under the influence of a major ice sheet. The CIROS-1 drill site in McMurdo Sound penetrated 702 m of glacigenic sediment dating back to earliest Oligocene time (c. 36 Ma). The lower part of this sequence illustrates the interaction of deposition from floating ice, sediment gravity flows and background muddy marine sedimentation derived from a subglacial source. The upper part is flat-lying and characterized by fluvial basal till and shallow glaciomarine facies. The core only spans Oligocene to Early Miocene time, since most of the younger sedimentary record was stripped off when the Ross Ice Shelf advanced to the edge of the continental shelf during Pliocene to Quaternary time. The younger part of the record, however, which was recovered at the drill-site, located in the inner part of Ferrar Fjord landwards of CIROS-1, shows a complex interaction of ice derived from the Ross Sea direction due to expansion of the West Antarctic Ice Sheet, and local ice from the Transantarctic Mountains. Another area drilled was Prydz Bay, seaward of the Lambert Glacier-Amery Ice Shelf. A series of five holes was drilled between the inner continental shelf and the continental slope. The recovered sequence comprises a lower composite sequence of sediments interpreted principally as waterlain till, deposited close to the grounding line as the glacier became decoupled from the bed at the continental shelf break. The sequence further shows evidence of loading events which are inferred to represent glacial advances across the shelf. (Auth. mod.)

E-47352
Kaul, N., **High resolution seismics and stratigraphy off Kapp Norvegia, Antarctica,** *Zeitschrift für Geomorphologie,* Mar. 1992 Suppl.86, International Conference on Geomorphology: Geomorphology and Geoecology, 2nd, Frankfurt/Main, Germany, Aug. 30-Sep. 3, 1989. Proceedings, Vol.8. Glacial and polar geomorphology. Edited by G. Stäblein et al, p.105-112, With French and German summaries. 11 refs.

From seismic measurements off Kapp Norvegia and the results of ODP Leg 113 it was possible to create a stratotype for the sedimentation of the eastern continental margin of the Weddell Sea. Fault control of the erosion-appearing Wegener Canyon is suggested. Although the sedimentary structure of the Explora Escarpment could be revealed by high resolution seismics, its tectonic implications remain uncertain. (Auth. mod.)

E-47353
Maüsbacher, R., **Distribution and stratigraphy of raised interglacial marine sediments on King George Island, South Shetlands, Antarctica,** *Zeitschrift für Geomorphologie,* Mar. 1992 Suppl.86, International Conference on Geomorphology: Geomorphology and Geoecology, 2nd, Frankfurt/Main, Germany, Aug. 30-Sep. 3, 1989. Proceedings, Vol.8. Glacial and polar geomorphology. Edited by G. Stäblein et al, p.113-123, With French summary. 9 refs.

During a 1986/1987 expedition to the South Shetland Is., cores of marine sediments were obtained by drilling. Sedimentological and chemical analysis provide information on sea level changes during the Holocene and last interglacial period. Holocene sea level was 20 m above the present one. In the vicinity of Fildes Peninsula, all higher level raised beaches pre-date the Holocene period. Sediments drilled at Muschelbach Valley give information on sea level changes at the end of the previous glaciation. Maximum sea level rise did not exceed 30 m during the last interglacial period. All higher elevation marine features and deposits show appreciable age. Their height is partly influenced by tectonic uplift. (Auth. mod.)

E-47354
Höfle, H.C., **Further evidence for a glacial maximum in Antarctica during the Late Neogene,** *Zeitschrift für Geomorphologie,* Mar. 1992 Suppl.86, International Conference on Geomorphology: Geomorphology and Geoecology, 2nd, Frankfurt/Main, Germany, Aug. 30-Sep. 3, 1989. Proceedings, Vol.8. Glacial and polar geomorphology. Edited by G. Stäblein et al, p.125-137, With French summary. 15 refs.

Glaciogeological and glaciological observations during the West German GANOVEX IV expedition to North Victoria land (1984/85) yield evidence for at least one glacial maximum during the Upper Neogene. Equivalent observations were made during a West German Expedition to the Shackleton Range at the end of Filchner Ice Shelf (Geisha 1986/87). Glacial deposits, ice-polished rock surfaces, striae, crescentic gouges and "roches moutonées" indicate a former ice stream from the S or SW that moved across the Shackleton Range. Based on exposed bedrock characteristics and elevation of once-glaciated terrain above the current ice level in the Shackleton Range and in North Victoria Land, it is estimated that the minimum additional ice thickness of the regional ice sheets must have been more than 1,000 m. Isotope analysis of ice-free rock surfaces suggests that the last glacial maximum ended during the lower Pliocene. (Auth. mod.)

E-47361
Mueller, P.A., **Geochemical and tectonic implications of igneous rocks from ODP Leg 114, subantarctic South Atlantic,** *Geo-marine letters,* 1992 12(4), p.214-222, 31 refs.

Igneous rocks recovered from three major tectonic features of the sub-antarctic South Atlantic Ocean during ODP Leg 114 have a range of compositions: Northeast Georgia Rise, basalt to andesite; Meteor Rise, basalt to trachyte; spreading center in the West South Atlantic Basin, MORB-like basalt. Major and trace element as well as Sr and Nd isotopic data clearly indicate that all rocks share the enriched elemental and isotopic signatures typical of both hotspot and mid-ocean ridge volcanism in the southern ocean basins. Data for the Northeast Georgia and Meteor Rises also suggest the influence of older continental lithosphere. (Auth.)

E-47362
Yoon, H.I., **Distribution, provenance, and dispersal pattern of clay minerals in surface sediments, Bransfield Strait, Antarctica,** *Geo-marine letters,* 1992 12(4), p.223-227, 27 refs.

Clay minerals of the surface sediments of Bransfield Strait exhibit distinctive geographical distributions: kaolinite has the highest concentration near the shore of the South Shetland Is. in the northern strait (20%); chlorite, near Smith I. in the northwestern strait; illite, on the continental shelf off the Antarctic Peninsula in the southern strait (80%); and smectite, close to the Penguin and Bridgeman islands in the northeastern strait (25%). This distribution pattern, combined with hydrographic and climatic data for the strait, is used to infer clay mineral provenance and dispersal patterns. (Auth.)

E-47367
Ingólfsson, Ó., Hjort, C., Björck, S., Smith, R.I.L., **Late Pleistocene and Holocene glacial history of James Ross Island, Antarctic Peninsula,** *Boreas,* 1992 21(3), p.209-222, 56 refs.

Studies of Quaternary glacial stratigraphy and morphology around the Antarctic Peninsula have shown that James Ross I. in the western Weddell Sea probably has the best occurrences of stratigraphic sections with datable material in the region. The stratigraphy includes sections with indefinite radiocarbon age, and three separate aminozones can be recognized. Except for indications of an early deglaciation *c.* 10,000 BP, the field evidence from northern James Ross I. suggests a glacial readvance around 7000 BP. It is concluded that the readvance reflects the combined effects of eustatic sea level rise and Holocene warming, leading to increased precipitation and a positive mass balance. The most recent large-scale deglaciation in the area took place around 6000-5000 BP. This confirms the evidence from lake sediments and moss banks in other parts of the Antarctic Peninsula region, which shows that, in most cases, the initiation of organic deposition took place after *c.* 6000 BP. The literature on the Holocene glacial and environmental history of the region is reviewed in light of the new field evidence. (Auth.)

E-47376
Shiraishi, K., **Explanatory text of geological map of Wideröefjellet, Sör Rondane Mountains, Antarctica,** *Tokyo. National Institute of Polar Research. Antarctic geological map series,* Mar. 1992 Sheet 32, 20p. + 9 plates + map, Refs. p.16-19.

A geological map of Mount Wideröe is presented on a 1:100,000 scale, with one location diagram and marking of moraines and petrological and geochronological data. The general geology of the area, the metamorphic, plutonic and dyke rocks, metamorphism, geological structure and geochronology are discussed in the accompanying text. Chemical analyses of the rocks are tabulated.

See also:
A-45069 A-46171 B-45339 B-45731 B-45738 B-45852 B-46185 B-46534 B-46608 B-46802 C-45118 C-45197 C-45799 C-46462 C-46572 C-47285 D-46057 F-45236 F-45376 F-45377 F-45445 F-45502 F-45525 F-45549 F-45759 F-45920 F-45924 F-46049 F-46062 F-46106 F-46137 F-46344 F-46438 F-46655 F-46664 F-46668 F-46889 F-46953 F-47003 F-47292 F-47327 F-47332 G-45451 G-46414 I-45070 I-45251 I-45258 I-45564 I-45740 I-45866 I-46430 I-46433 I-46435 I-46746 I-47244 I-47247 I-47303 J-45075 J-45188 J-45341 J-45408 J-45489 J-45688 J-45692 J-45819 J-45925 J-45933 J-46160 J-46165 J-46169 J-46422 J-46426 J-46698 J-46853 J-46938 J-47119 J-47217 J-47306 J-47372 L-45120 L-45123 L-45167 L-45168 L-45469 L-45706 L-45708 L-45801 L-45802 L-45883 L-45886 L-45892 L-46084 L-46193 L-46343 L-46461 L-46643 L-46768 L-46893 L-46945 L-47019 L-47330 L-47371

F. ICE AND SNOW

F-45063
Steiner, D.R., Ehlers, M., **Digital database of remotely sensed data for glacial study in Antarctica,** International Geoscience and Remote Sensing Symposium (IGARSS '90), College Park, MD, May 20-24, 1990. Digest, Vol.2. Remote sensing science for the nineties, New York, Institute of Electrical and Electronics Engineers, Inc., 1990, p.1263-1266, 9 refs.

This paper describes the establishment of a digital database based on satellite images, acquired over time, to be used for monitoring the velocities of the ice flow of the polar ice caps. The area of study for this project is Byrd Glacier in East Antarctica. The images, acquired over a 10 year period, are registered and georeferenced using established ground control points. The images are enhanced and used to measure the movement of prominent surface features. The resulting database of digitally processed, "time lapsed" images provides a valuable source of information about glacial flow and ice sheet mass balance for use in global climate modeling. (Auth. mod.)

F-45064
Garrity, C., Ramseier, R.O., Rubinstein, I.G., **Snow wetness and SSM/I brightness temperatures for the Weddell Sea,** International Geoscience and Remote Sensing Symposium (IGARSS '90), College Park, MD, May 20-24, 1990. Digest, Vol.2. Remote sensing science for the nineties, New York, Institute of Electrical and Electronics Engineers, Inc., 1990, p.1521-1524, 4 refs.

During the Winter Weddell Gyre Study 1989, the RV *Polarstern* transected the Weddell Sea west to east. Detailed snow pit studies which included the determination of the amount of free water within the snow pack were correlated with the brightness temperatures from the Special Sensor/Microwave Imager. The results indicate a steep increase in brightness temperatures with increasing free water content from 0 to 1% by volume. (Auth.)

F-45077
Alley, R.B., Whillans, I.M., **Changes in the west antarctic ice sheet,** *Science,* Nov. 15, 1991 254(5034), p.959-963, Numerous refs.

The portion of the west antarctic ice sheet that flows into the Ross Sea is thinning in some places and thickening in others. These changes are not caused by any current climatic change, but by the combination of a delayed response to the end of the last global glacial cycle and an internal instability. The near-future impact of the ice sheet on global sea level is largely due to processes internal to the movement of the ice sheet, and not so much to the threat of a possible greenhouse warming. Thus the near-term future of the ice sheet is already determined. However, too little of the ice sheet has been surveyed to predict its overall future behavior. (Auth.)

F-45087
Kobayashi, S., **Estimating method of the precipitation in snow storms,** *Seppyo,* Mar. 1991 53(1), p.53-59, In Japanese. 15 refs.

A method is described for estimating the amount of snow that falls in a particular snowstorm by applying general turbulent flow theory to the density of blowing snow at given heights up to 30 m. Estimates of annual precipitation were compared with measurements at Mizuho Station. The results are presented in graphs with English captions.

F-45108
Nagurnyĭ, A.P., Savchenko, V.G., Potapenko, V.IU., **Numerical modelling of the effect of snow accumulation rate and level of the World Ocean on the fluctuations of the East Antarctic ice sheet in the Late Pleistocene** [Chislennoe modelirovanie vliianiia skorosti akkumuliatsii snega i urovnia mirovogo okeana na kolebaniia lednikovogo pokrova Vostochnoĭ Antarktidy v pozdnem pleĭstotsene], *Akademiia nauk SSSR. Institut geografii. Materialy gliatsiologicheskikh issledovaniĭ,* May 1990 No.69, p.65-70, In Russian with English summary. 13 refs.

Features of numerical modelling of the East Antarctic ice sheet on the basis of zero-, and one- and two-dimensional models are analyzed. Estimations of the ice sheet stability under different temporal and spatial scales of averaging are made. Fluctuations of the free surface and margins of the East Antarctic ice sheet have been studied with the help of a one-dimensional non-stationary model, which includes the equations describing the dynamics of the ice sheet free surface, position of the grounding line and also the initial and boundary conditions. The response of the ice sheet to changes in the accumulation rate and the World Ocean level has been estimated numerically. Computations have been made with a time interval of 10 years, and embrace the last climatic cycle of 125,000 years. Numerical estimates of the fluctuations of free surface, grounding line and ice discharge into the Ocean were made. (Auth.)

F-45109
Zagorodnov, V.S., Watanabe, O., Fudzhin, E., Khaĭzenberg, Dzh., **Automatic measurements of the dimensions of crystals and the concentration of inclusions in an ice core: methods and initial results** [Avtomaticheskie izmereniia razmerov kristallov i kontsentratsii vkliuchenii v ledianom kerne: metod i pervye rezul'taty], *Akademiia nauk SSSR. Institut geografii. Materialy gliatsiologicheskikh issledovaniĭ,* May 1990 No.69, p.177-184, In Russian with English summary. 11 refs.

With the use of laser sensors it was possible to experiment with automatic measurements of transverse dimensions of crystals in samples of artificial and natural antarctic ice obtained at Mizuho Station. Automatic measurements of the concentration and dimensions of air inclusions, and also the position of the C-axis of ice crystals continuously along the ice core were made. The theoretical rate of measurements of the above-mentioned parameters can reach 1000 measurements/sec or about 1 m/sec when the sensors move along the ice. Depending on the thickness of the ice plate, the variation range of the output signal of sensors with different positions of the C-axis of crystals is 0.5-5V. The theoretical resolution capacity of the method under the changed position of the C-axis is about 0.1 deg. Laser sensors allowed the inclusions with a diameter of about 1 micromicron in the ice core to be distinguished. In the near future experiments on automatic preparation of continuous micro-sections of the ice core will be conducted. The obstacle for receiving structural data with the use of the above-mentioned sensors is mainly due to the presence of thermic crevasses in ice cores obtained by a thermodrill in central Antarctica. (Auth. mod.)

F-45111

Glazovskiĭ, A.F., **Soviet glaciological studies in 1989** [Sovetskie gliatsiologicheskie issledovaniia v 1989 godu], *Akademiia nauk SSSR. Institut geografii. Materialy gliatsiologicheskikh issledovaniĭ,* May 1990 No.69, p.224-235, In Russian.

This report is first divided according to general topic or region and then is subdivided into specific topics and the institutions sponsoring the research. The section on Antarctica includes such topics as drilling at the Amery Ice Shelf, Vostok Station, and the Mirnyy-Vostok traverse; carbon dioxide in the core; oscillation of the rim of the antarctic cover; 4 isotopic analyses; reconstruction of the paleoclimate; the snow-firn mass at the Mirnyy-Vostok traverse, and a chromograph of ice.

F-45122

Keller, M., Diaz, M.T., Skvarca, P., **Geophysical study in the northern sector of the Antarctic Peninsula and the Larsen Ice Shelf** [Estudio geofísico en el sector norte de la peninsula antártica y barrera de hielos Larsen], Actas de la Primera Conferencia Latinoamericana sobre Geofísica, Geodesia e Investigación Espacial Antárticas. (First Latin American Conference on Antarctic Geophysics, Geodesy and Space Research, Buenos Aires, July 30-Aug. 3, 1990. Proceedings.) Edited by A. Louro, M.A. Van Zele, and I. Velasco, [Buenos Aires, Centro Latinoamericano de Física, 1990], p.81-90, In Spanish. 9 refs.

The sea bottom topography and the thickness of the Larsen Ice Shelf were determined on the basis of seismic records and gravimetric data obtained from gravity bases tied to existing intercontinental networks through South America and the Antarctic Peninsula. The gravimetric ties among stations are described, and the seismic and gravimetric profiles are discussed and illustrated. A 4-layer model, constructed on the basis of the Bouguer anomaly observed and the thickness of ice obtained by seismic refraction, shows a fairly regular sea bottom topography which increases in depth toward the Jason Peninsula; 700 m as the average thickness of marine sediments; and a water layer of less than 200 m.

F-45153

Morgan, V.I., Goodwin, I.D., Etheridge, D.M., Wookey, C.W., **Evidence from antarctic ice cores for recent increases in snow accumulation,** *Nature,* Nov. 1991 354(6348), p.58-60, 21 refs.

Present ice sheet estimates indicate that both the outflow and the net accumulation are approximately equal to 2,000 cu km of ice per year (equivalent to about 6 mm of sea level). The temporal variation of accumulation rate is central to determinations of the mass budget, because accumulation can change rapidly in response to short-term climate variations, whereas ice flow varies only on longer time scales. Here time series are presented showing changes in the net rate of snow accumulation since 1806 along a 700 km segment of East Antarctica. The accumulation record was derived from the thicknesses of annual layers in ice cores, deduced from seasonal variations in oxygen isotope ratio and in ice-crust stratigraphy. A significant increase in the accumulation rate occurs following a minimum around 1960, leading to recent rates that are about 20% above the long-term mean. If this recent increase is widespread, as suggested by shorter-term accumulation data from across a large part of Antarctica, the positive imbalance (5-25% of the mass input) shown in recent studies of the ice sheet mass budget may have existed only since the late 1960s. It is estimated that this increase in accumulation rate should contribute to a lowering of sea level of 1.0-1.2 mm per year. (Auth.)

F-45185

Ventajas, L., **Polynucleate hydrocarbons in antarctic sea ice** [Hidrocarburos polinucleados en hielos marinos antárticos], *Buenos Aires. Instituto Antártico Argentino. Contribución,* 1991 No.384, p.1-11, In Spanish with English, French and German summaries. 3 refs.

The diffusion of polynucleate hydrocarbons in sea ice over time is investigated by means of the following two experiments: ice exposed for increasing periods to water in the bilge of the icebreaker ARA *Almirante Irizar,* which showed increasing concentrations of polynucleate hydrocarbons in ice to be in direct proportion to time of exposure; and ice exposed to petroleum and sea water mixtures for different lengths of time, which showed the extent of the polynucleate hydrocarbon penetration into the ice interior to also coincide with length of exposure. It is concluded that the greatest danger of oil spills rich in polynucleate hydrocarbons lies in their penetrating the ice interior since, due to action of winds and currents, the ice is transported to uncontaminated areas which it will contaminate when it melts. (Auth. mod.)

F-45198

Jezek, K.C., **Comparison between SSMR and SSM/I passive microwave data collected over the antarctic ice sheet,** *Byrd Polar Research Center. Technical report,* 1991 BPRC TR 91-03, 62p., 10 refs.

Passive microwave brightness temperature data collected during the overlap period between the Scanning Multichannel Microwave Radiometer and the Special Sensor Microwave Imager are compared. Only data collected over the Antarctic Ice Sheet are used in order to limit spatial and temporal complications associated with the open ocean and sea ice. Linear regressions are computed from scatter plots of complementary pairs of channels from each sensor, revealing highly correlated data sets. That a simple linear model can be used to correlate the data is used to support the argument that there are important relative calibration differences between the two instruments. (Auth.)

F-45215

Semiletov, I.P., **Paleovariations of CO2 content in antarctic ice cores,** *USSR Academy of Sciences. Transactions. Earth science sections,* July 1991 309(1-6), p.245-247, 14 refs. For Russian original see 44-2606 or 18F-41641.

This paper presents the first measurements of atmospheric CO2 in the air inclusions of antarctic ice cores more than 60,000 years old, obtained from a unique drillhole at the Soviet Vostok Station and a drillhole at Kilometer 150 on the traverse from Mirnyy to Vostok. (Auth. mod.)

F-45236

Bolshov, M.A., **Direct ultratrace determination of cadmium in antarctic and Greenland snow and ice by laser atomic fluorescence spectrometry,** *Analytica chimica acta,* Oct. 21, 1991 251(1-2), p.169-175, 27 refs.

Results of the first direct measurements of Cd in antarctic and Greenland ancient ice and recent snow at ultratrace levels of ultrasensitive laser-excited atomic fluorescence spectrometry with electrothermal atomization are presented. Ultratrace concentration Cd standards allowed calibration of the spectrometer down to the 0.1 pg Cd/g level. The limit of detection was found to be as low as about 0.01 pg Cd/g using 50-microliter sample volumes, which corresponds to a minimum detected Cd absolute mass of about 0.5 fg. Various antarctic and Greenland samples were then analyzed without any preliminary preconcentration step. (Auth.)

F-45240
Mikhaĭlov, N.F., **Radar observation of icebergs in Alasheyev Bight** [Radiolokatsionnye nabliudeniia za aĭsbergami v zalive Alasheeva], *Sovetskaia antarkticheskaia ekspeditsiia. Trudy,* 1990 Vol.89, p.42-45, In Russian.

Data on the direction, speed and height of about 200 icebergs drifting during 1986 in Alasheyev Bight 70-150 km from the coast, monitored by radio located in the vicinity of Molodezhnaya Station, are discussed and their trajectories are illustrated.

F-45243
IUlin, A.V., Chuguĭ, I.V., **Ice drifting properties in the Russkaya Station region** [Osobennosti dreĭfa l'da v raĭone stantsii Russkoĭ], *Sovetskaia antarkticheskaia ekspeditsiia. Trudy,* 1990 Vol.89, p.50-57, In Russian. 5 refs.

Data from observations of sea ice movement, carried out on the *Mikhail Somov* during its forced drift in the vicinity of Russkaya Station in 1985, are analyzed. Statistics on the ice drift speed, stability, direction and on wind effects are presented. A quantitative assessment is made, using a correlation method, of the drift and surface circulation variables.

F-45247
Krivoshein, V.K., **Morphologic properties of the Pacific ice massif** [Morfologicheskie osobennosti Tikhookeanskogo ledianogo massiva], *Sovetskaia antarkticheskaia ekspeditsiia. Trudy,* 1990 Vol.89, p.80-89, In Russian. 18 refs.

Based on Meteor satellite data, a study is reported of the variability of horizontal dimensions of ice blocks of the Pacific ice massif, the Bellingshausen Sea and the Russkaya Station area, from Nov. 1982 to Mar. 1983. Ice cover changes, from the onset of melting to the formation of new ice, and the intensity of the breakup, are discussed and shown in graphs. It is found that the larger blocks of ice disintegrate faster than those of small size which, in turn, freeze more intensely. Ice cover disintegration begins one month earlier in the Bellingshausen Sea than in the Russkaya Station area.

F-45248
Krivoshein, V.K., **Spatial and temporal variability of ice concentration in the South Pacific Ocean** [Prostranstvenno-vremennaia izmenchivost' splochennosti l'da v tikhookeanskom sektore IUzhnogo okeana], *Sovetskaia antarkticheskaia ekspeditsiia. Trudy,* 1990 Vol.89, p.89-98, In Russian. 6 refs.

The effect of different ice concentrations on general ice conditions in the Pacific section of the southern ocean, during changes of total ice volume, is evaluated. The correlation between the ice surface area and different density, and their changes in time, is calculated and shown in graphs.

F-45249
Bessonov, V.I., Morozov, E.L., Provorkin, A.V., **Giant icebergs in the Weddell Sea** [Gigantskie aĭsbergi moria Ueddella], *Sovetskaia antarkticheskaia ekspeditsiia. Trudy,* 1990 Vol.89, p.99-108, In Russian. 5 refs.

Calving of the Larsen and Filchner ice shelves, resulting in 3 giant icebergs drifting in the Weddell Sea, were observed by satellite in 1986; their trajectory was followed through May 1988. The causes of the calvings are discussed, and data on the iceberg drift are presented.

F-45250
Korotkov, A.I., **Effect of coastal configuration on the ice regime of antarctic marginal seas** [Vliianie konfiguratsii poberezh'ia na ledovyĭ rezhim okrainnykh antarkticheskikh moreĭ], *Sovetskaia antarkticheskaia ekspeditsiia. Trudy,* 1990 Vol.89, p.108-117, In Russian. 19 refs.

From a review of pertinent literature, the configuration and dynamics of the coastal ice cover, the surface ocean circulation and the prevailing coastal winds are found to be important physical and geographic factors in the formation and development of polynyas. The ice conditions in the Somov and Amundsen Sea, from the Meteor satellite data obtained on Feb. 18 and 19, 1987, are illustrated.

F-45307
Bogorodskiĭ, V.V., **Status and prospects of studies of ice and ocean physics** [Sostoianie i perspektivy issledovaniĭ fizika l'da i okeana], *Problemy arktiki i antarktiki,* 1991 Vol.66, p.55-82, In Russian with English summary. 177 refs.

A brief analysis of hydrophysical and glaciological studies in polar areas (including Antarctica) carried out by the Department of Ice and Ocean Physics of the Arctic and Antarctic Research Institute is given. Data on the problem areas of ice physics and mechanics, acoustic and optical properties of ice, snow and water masses and related phenomena are presented. The possibilities for remote sensing radio-physical methods in oceanographic and ice studies are considered. (Auth. mod.)

F-45345
Symposium on Ice-Ocean Dynamics and Mechanics, Hanover, NH, Aug. 26-31, 1990, **Proceedings,** *Annals of glaciology,* 1991 Vol.15, 282p., Refs. passim. For individual papers see 46-1705 through 46-1744 or F-45346 through F-45353.

Of the 40 papers presented in this volume, 8 are pertinent to Antarctica and cover the following subjects: ice drift, texture and growth in the Weddell Sea; collision of ice floes under wave action; flow stripes on the Ross Ice Shelf; ocean, atmosphere and sea ice interaction; and sea ice observations from the drifting M.V. *Nella Dan* in the spring of 1985.

F-45346
Hoeber, H., **Sea-ice dynamics in the Weddell Sea in winter,** *Annals of glaciology,* 1991 Vol.15, Symposium on Ice-Ocean Dynamics and Mechanics, Hanover, NH, Aug. 26-31, 1990. Proceedings, p.9-16, 9 refs.

Observations of ice drift received from an array of ARGOS buoys drifting in the Weddell Sea in winter 1986 are described. Wind and current data are also available, permitting derivation of the complete momentum budget including the internal ice stress computed as residuum. It is shown that the variability of forcing both of the atmosphere and of the ocean is large, and that internal ice stress is not negligible; monthly vector averages amount to about half of the wind and water stresses. Coefficients of shear and bulk viscosity are derived according to Hibler's model of ice rheology; they turn out to be negative occasionally, in particular when small-scale forcing of the atmosphere is large. (Auth.)

F-45347
Shen, H.H., Ackley, S.F., **One-dimensional model for wave-induced ice-floe collisions,** *Annals of glaciology,* MP 2983, 1991 Vol.15, Symposium on Ice-Ocean Dynamics and Mechanics, Hanover, NH, Aug. 26-31, 1990. Proceedings, p.87-95, 7 refs.

From observations made in the 1986 Winter Weddell Sea Project, the characteristics of ice floes and the formation process are described. The collision of ice floes under the action of a monotonic wave is quantified. The lateral motion of an ice floe caused by the wave is modeled as the sliding of an object under gravity. Drag and added mass effects are included in the model. Two floes located at different positions are shown to have a net difference in their drift (caused only by repeated wave passages). In most cases, this differential drift eventually causes floe collision. When two floes collide, a spring and dash-pot model is adopted to calculate the contact force. A one-dimensional wave passing through a one-dimensional array of disc-shaped floes is examined. Two phenomena are apparent from the analysis: waves have a herding effect that forms bands of floes with the width equal to the wavelength, and the frequency of collision is sensitive to the elastic properties of the floes and the wave amplitude. The floes stay in contact for prolonged periods, indicating the potential to freeze together and form composite floes, as was observed in the field studies. (Auth. mod.)

F-45348

Casassa, G., Jezek, K.C., Turner, J., Whillans, I.M., **Relict flow stripes on the Ross Ice Shelf,** *Annals of glaciology,* 1991 Vol.15, Symposium on Ice-Ocean Dynamics and Mechanics, Hanover, NH, Aug. 26-31, 1990. Proceedings, p.132-138, 21 refs.

Analysis of AVHRR data collected during the summer and winter over the Ross Ice Shelf reveals complex patterns of curvilinear stripes. In particular, a large, looping pattern of stripes is observed west of Crary Ice Rise in an area where conventional glaciological data collected with surface and airborne methods have been interpreted to suggest uncomplicated flow. On the basis of previous work using radar data to study ice flow downstream of Crary Ice Rise, it is concluded that the stripes represent relict flowlines. The mechanism that produces these stripes is unclear, but it is hypothesized that they are associated with subtle topography. Based solely on the patterns of stripes and their location in the outflow of major ice streams, it is proposed that they are related to an ice raft torn from the grounded ice sheet about 400 km upstream from its present position. (Auth.)

F-45349

Worby, A.P., Allison, I., **Ocean-atmosphere energy exchange over thin, variable concentration antarctic pack ice,** *Annals of glaciology,* 1991 Vol.15, Symposium on Ice-Ocean Dynamics and Mechanics, Hanover, NH, Aug. 26-31, 1990. Proceedings, p.184-190, 22 refs.

Several recent studies have suggested that much of the wintertime antarctic ice is thin (<0.3 m). The presence of extensive areas of thin ice has a significant effect on ocean-atmosphere energy exchange. This is investigated using the Maykut (1978) thin-ice energy budget model in a study for typical Sep. antarctic ice and climatic conditions. In this one-dimensional sensitivity study, a constant floe size is assumed, and ice concentration variations are simulated by changing the width of the leads between floes. The modelled results, for the floe size considered, indicate that at 80% ice concentration the turbulent heat loss through the thin ice component can be greater than that from leads. As concentration decreases, however, the fractional loss through the ice, and hence the ice-thickness distribution, becomes less significant. For concentrations lower than 50%, there is little change in turbulent loss with further decrease in ice cover, as the atmosphere effectively "sees" open ocean. (Auth. mod.)

F-45350

Stössel, A., **Application of an atmospheric boundary layer model to a large-scale coupled sea-ice—oceanic mixed-layer model for the southern ocean,** *Annals of glaciology,* 1991 Vol.15, Symposium on Ice-Ocean Dynamics and Mechanics, Hanover, NH, Aug. 26-31, 1990. Proceedings, p.191-195, 15 refs.

A coupled sea-ice—oceanic mixed-layer model for the southern ocean is forced with daily atmospheric variables from the global analyses of the European Center for Medium Range Weather Forecasts (ECMWF). In order to avoid a predetermination of the simulated sea-ice conditions from the (climatological) specification of the surface boundary conditions in the atmospheric general circulation model (AGCM), the sea-ice model is coupled additionally to a one-dimensional atmospheric boundary layer model. The results are rather poor, in that the ice extent as well as the ice velocities are generally too low and that the ice thickness distribution resembles the results of a pure thermodynamic sea-ice model. The results with the forcing from the higher level are more realistic when snow and mixed-layer effects are neglected. This indicates that the parameterizations in the atmospheric boundary layer model have to be readjusted in order to interact realistically with the snow-sea ice-oceanic mixed-layer model. It is suggested that the pattern of the wind field, whether from the geostrophic or the surface level, has a significant influence on the sea ice model results. (Auth. mod.)

F-45351

Budd, W.F., Simmonds, I., Wu, X.R., **Physical basis for a dynamic antarctic sea-ice model for use with an atmospheric GCM,** *Annals of glaciology,* 1991 Vol.15, Symposium on Ice-Ocean Dynamics and Mechanics, Hanover, NH, Aug. 26-31, 1990. Proceedings, p.196-203, 23 refs.

An observed ocean-drift data set is used as the basis of a wind-driven coupled ocean-sea ice-atmosphere model including interaction and feedback. The observed characteristics of the antarctic sea ice are described, including the ice thickness, ice concentration and horizontal advection. The atmospheric model computes heat fluxes, sea ice growth, changes in concentration and advection. Sensitivity studies show reasonable and stable simulations of the observed sea ice characteristics for the present mean antarctic winter climate. The response times and feedbacks of the ice-atmosphere system as represented by the model appear to allow scope for the development of some persistence of anomalies. (Auth.)

F-45352

Lange, M.A., Eicken, H., **Textural characteristics of sea ice and the major mechanisms of ice growth in the Weddell Sea,** *Annals of glaciology,* 1991 Vol.15, Symposium on Ice-Ocean Dynamics and Mechanics, Hanover, NH, Aug. 26-31, 1990. Proceedings, p.210-215, 15 refs.

Studies of sea ice texture conducted during a number of expeditions into the Weddell Sea are discussed, showing that the sea ice in the Antarctic is dominated by granular ice of frazil origin in floes of all ages, in contrast to ice in the Arctic, which consists predominantly of columnar ice of congelation origin. The large fraction of granular ice in first-year sea ice is a result of the dominant ice-formation process in the advancing ice edge, the pancake cycle. The dominance of granular over columnar ice in second- and/or multi-year ice is a result of the large degree of deformational activity in the southern ocean. (Auth.)

F-45353

Jacka, T.H., Thwaites, R., Wilson, J.C., **Antarctic field study of the rheology and movement of a sea-ice floe aggregate,** *Annals of glaciology,* 1991 Vol.15, Symposium on Ice-Ocean Dynamics and Mechanics, Hanover, NH, Aug. 26-31, 1990. Proceedings, p.261-264, 7 refs.

M.V. *Nella Dan* was beset in ice near 66S, 51E from Oct. 27 to Dec. 15, 1985. The scientific investigations in the sea-ice zone included ice thickness, concentration and extent measurements, aerial photography of the ice, a core drilling project, meteorological observations, repeat measurements of a small strain grid and measurements of the sea-ice drift rate. Analysis of measurements of the strain grid area over an 11 d period shows that, although there is some indication that the ice field may have been divergent, opening by approximately 3.4% over this period, there are large errors in the measurements and some doubt must be placed on the reliability of this estimate. The drift speed and direction were found to be highly dependent on wind speed and direction, the drift rate being approximately 2.7% of the wind speed at an angle of about 29 deg to the left of the wind direction. (Auth. mod.)

F-45358

Dieckmann, G.S., Lange, M.A., Ackley, S.F., Jennings, J.C., Jr., **Nutrient status in sea ice of the Weddell Sea during winter: effects of sea ice texture and algae,** *Polar biology,* MP 2986, Dec. 1991 11(7), p.449-456, Refs. p.455-456.

Cores and brine samples from sea ice of the Weddell Sea were analyzed for nutrients (phosphate, nitrate and silicate), salinity and chlorophyll *a* during winter. Stratigraphic analyses of the cores were also carried out. Bulk nutrient concentrations in the sea ice fluctuated widely and did not correlate with salinity; they varied between zero and two or three times those measured in the water column. Differentiation into young and old sea ice, however, revealed that nutrient concentrations in the young sea ice in many cases correspond to those in surface seawater. In older ice, nutrients showed signs of increase as well as depletion or exhaustion relative to the water column. Most of the changes in the nutrient concentrations are attributed to an increase in biological activity as the seasons progress. Silicate is expected to become the first nutrient likely to limit growth of diatoms in the ice, which is ascribed to slower regeneration or dissolution of this nutrient relative to phosphate and nitrate. A consequence of silicate exhaustion may be the succession of different algal assemblages, from a diatom-dominated community to one in which autotrophic flagellates form the largest component. (Auth. mod.)

F-45364

Steffen, K., Schweiger, A.J., **NASA team algorithm for sea ice concentration retrieval from Defense Meteorological Satellite Program special sensor microwave imager: comparison with Landsat satellite imagery,** *Journal of geophysical research,* Dec. 15, 1991 96(C12), p.21,971-21,987, 24 refs.

Validation of the NASA team algorithm for the determination of sea ice concentrations from the Defense Meteorological Satellite Program special sensor microwave imager (SSM/I) is described. A total of 28 cloud-free Landsat scenes were selected in order to permit validation of the passive microwave ice concentration algorithm for a range of ice concentrations and ice types. The sensitivity of the NASA team algorithm to the selection of locally and seasonally adjusted algorithm parameters is discussed in detail. Mean absolute differences between SSM/I and Landsat ice concentrations are within 1% during fall, using local and global tie points. Standard deviations of the difference are +/-3.1% and +/-6.2% respectively. The overall accuracy of the NASA team algorithm is lower in spring than in fall. In areas with greater amounts of nilas and young ice, it is found that the NASA team algorithm underestimates ice concentrations by as much as 9%. In summer, mean differences between SSM/I and Landsat ice concentrations are 7.2% for local tie points and 11.7% for global tie points for antarctic areas. It is suggested that the standard deviation between SSM/I and Landsat ice concentrations decreases from +/-7% to +/-5% with local tie points compared to global ones for spring and fall. (Auth. mod.)

F-45376

Boiarskiĭ, V.I., **Radar investigations of the thickness and composition of the ice sheet along the Mirnyy-Komsomol'skaya route** [Radiolokatsionnye issledovaniia tolshchiny i stroeniia lednikovogo pokrova po trasse Mirnyĭ-Komsomol'skaia], *Leningrad. Arkticheskiĭ i antarkticheskiĭ nauchno-issledovatel'skiĭ institut. Trudy,* 1991 Vol.421, p.98-104, In Russian.

Results obtained from radar sounding of the antarctic ice sheet, carried out by the radiophysical group of the 32nd Soviet Antarctic Expedition, are described. Data are given on the equipment used and the elevation of the ice sheet and bedrock along the new Mirnyy-Komsomol'skaya route. Also presented are data on the depth of internal inhomogeneities in the ice sheet. (Auth. mod.)

F-45377

Kirillov, V.A., Paramonov, A.I., **Interpreting sea ice and bedrock of Antarctica from passive infrared sounding data** [Deshifrirovanie morskogo l'da i korennykh porod Antarktidy po dannym passivnogo IK-zondirovaniia], *Leningrad. Arkticheskiĭ i antarkticheskiĭ nauchno-issledovatel'skiĭ institut. Trudy,* 1991 Vol.421, p.105-115, In Russian. 5 refs.

Data from experimental investigations of natural thermal radiation in the infrared range from ice of various ages and strengths from the southern ocean, as well as the area of Bunger Hills, are presented. Results from a sample numerical interpretation of sea ice cover and sections of bedrock (horizontal projection) based on satellite data are also reported. (Auth. mod.)

F-45445

Pattyn, F., Huybrechts, P., Decleir, H., **Modeling glacier fluctuations in the Sör Rondane, Dronning Maud Land, Antarctica,** *Zeitschrift für Gletscherkunde und Glazialgeologie,* 1989 25(1), p.33-47, With German summary. 14 refs.

Morainic deposits found above the present glacier surface in the central Sör Rondane Mountains give evidence of former glaciations. In this paper, an attempt is made to interpret these observed glacier fluctuations in terms of environmental change. To do this, a numerical flowline model, taking into account thermodynamics and a coupled ice shelf, has been developed and is applied to two outlet glaciers through the mountain range, Gunnestadbreen and Jenningsbreen. It is found that lower ice temperatures, reduced accumulation, and a drop in sea level corresponding to typical glacial conditions account for a 150-200 m rise in glacier level. From a comparison of these results with a palaeogeographical reconstruction for a "maximum" glacial stage for Jenningsbreen by Hirakawa et al. (1989) it is argued that their morainic deposits relate to an earlier Cenozoic glaciation involving a full-grown ice sheet. (Auth.)

F-45447

MacAyeal, D.R., **Basal stress distribution of ice stream E, Antarctica inferred by control methods,** *Journal of geophysical research,* Jan. 10, 1992 97(B1), p.595-603, 14 refs.

The irregular spatial distribution and velocity independence of basal friction derived from Landsat measured surface velocity suggest that ice stream flow is not controlled by the properties of a deformable basal till alone. Rigid bedrock substrata may contact the base of the ice stream in small (<100 sq km) areas where the velocity field displays strong vorticity and where the ice stream surface appears rumpled in Landsat images. (Auth.)

F-45456

Enomoto, H., **Kinematics of sea ice and atmospheric conditions in the Antarctic,** *Zürcher geographische Schriften,* 1991 No.42, 185p., Refs. p.167-172.

DLC GB 2597.E56 1991

The relationships between the atmosphere and sea ice conditions around Antarctica are discussed. The main features of the annual and intra-annual variations in the state of the sea ice are derived from satellite data, and these are used to describe the mechanisms which relate annual sea ice changes to atmospheric circulation. The major result of this study is the discovery of the six month periodicity in the lower tropospheric circulation which is neither obvious nor dominant. This less conspicuous periodic change in circulation, however, exerts an important effect on the seasonal variations in ice conditions, especially the area covered, which in turn produces an important effect on the antarctic climate. The circulation component is identified as the atmospheric convergence line which generally follows or is to the north of the antarctic periphery, with seasonal movements following changes in sea level pressure.

F-45462

Huang, M.H., Wang, W.T., Li, J., Li, G., **Repeated compression-annealing experiments on anisotropic core ice,** *Antarctic research,* June 1991 2(1), p.22-29, 12 refs.

Three runs (6 samples) of repeated uniaxial compression annealing experiments were conducted on a creep testing machine with a loading accuracy of 1% at -2 +/- 0.2 C. The tested samples were cut from BHQ ice core. Results show that under warm temperature and large load, the initial features of structure and fabric disappear, a small circle girdle fabric with fine equigranular grains appears, and a multimaxima fabric develops to some extent. Analysis of structure and fabric shows that the formation mechanism of new fabrics in these experiments is principally recrystallization. With the repetition of compression-annealing, the differences in the fabric of the six samples are reduced, their rheological behavior tends to be uniform, and their grain size decreases towards a steady state value. (Auth. mod.)

F-45463

Lu, P.D., Zhang, K.C., Huang, F.P., Watanabe, K., **Ecological observations on coloured layer of coastal fast ice in Great Wall Bay, King George Island, Antarctica,** *Antarctic research,* June 1991 2(1), p.39-45, 23 refs.

Marine biological and environmental investigations of ice and coastal waters off the Great Wall Station were carried out from Nov. 17, 1988 to Mar. 3, 1989. The fast ice covered the inner part of the Great Wall Bay until mid-Dec., with the ice thickness ranging from 90 to 70 cm, including 20 cm of snow cover. A 5 cm brown layer occurred in the middle part of an ice core collected on Nov. 20, and two brown layers occurred in the interior of ice cores collected on Nov. 17, 20 and 26. In comparison to the water column, chlorophyll-*a* concentration in fast ice was higher, ranging from 2.55 to 56.84 mg/cu m, and occurring in the middle layers of the ice rather than in bottom layers as often observed in other coastal areas. Measurements of temperature, transparency, nutrients and chlorophyll-*a* in the water column are presented in tables. Microalgal assemblages in fast ice and in the water column of Great Wall Bay are reported. (Auth. mod.)

F-45470

Nierenberg, W.A., ed, **Encyclopedia of earth system science,** San Diego, Academic Press, 1991, 4 vols., Refs. passim. For selected papers see 46-1937 through 46-1957 or A-45471, F-45472, F-45474, F-45476, F-45478, F-45479, I-45477, J-45473 and J-45475.

DLC QE5.E514 1991

This 4-volume set contains a general article on Antarctica as well as 7 other articles dealing with that continent on such topics as climate-ice interactions, the impact of deglaciation on ocean circulation, Antarctic Bottom Water, icebergs, and the West Antarctic Ice Sheet. Each article consists of an outline that lists the main subject headings, a paragraph or series of paragraphs defining the primary subject of the article, the main text, bibliographic references, and a glossary of significant terms in the context of their use in the article. The final feature of Vol.4 is a detailed subject index. (Auth.mod.)

F-45474

Ackley, S.F., **Icebergs,** MP 2998, Encyclopedia of earth system science, Vol.2. Edited by W.A. Nierenberg, San Diego, Academic Press, 1991, p.571-582, 11 refs.

Icebergs are the floating remnants of ice produced on the continents in glaciers, ice sheets, and ice shelves that originate as snow compressed into ice. They differ from sea ice, which also floats in the ocean in cold regions, in that sea ice is produced by the direct freezing of seawater. Icebergs are a unique part of the earth's hydrologic cycle. The cycle is initiated as oceanic evaporated moisture which is condensed, frozen, and deposited as snow precipitation on the continents and compressed into ice by a 100 m or so of overburden snow. The ice flows to the ocean in ice streams or glaciers that are driven by gravity and that densify and deform as the ice migrates (they behave as slowly moving rivers of ice). The cycle is completed by the ice breaking off into the sea as icebergs, which then melt slowly in the ocean. For the dominantly ice portion of the hydrologic cycle the time scales are typically from decades to thousands of years, compared with the annual or slightly longer time scales more typical of the water-based hydrologic cycle in lower latitudes. Icebergs in Antarctica, Greenland, Alaska, and other northern hemisphere regions are discussed in this article. (Auth.mod.)

F-45478

Weeks, W.F., **Sea ice,** Encyclopedia of earth system science, Vol.4. Edited by W.A. Nierenberg, San Diego, Academic Press, 1991, p.39-52, 13 refs.

Sea ice, any form of ice found at sea that originated from the freezing of seawater, has historically been the least studied of all the phenomena that have a significant effect on the surface heat balance of the earth. Because the logistic and operational problems that produced this neglect have recently lessened, considerable information is now available on the nature and behavior of this unusual material as well as its role in influencing the weather, the climate, and the oceanography of the arctic and antarctic regions and possibly of the planet as a whole. (Auth.mod.)

F-45479

Long, W.E., **West Antarctic Ice Sheet,** Encyclopedia of earth system science, Vol.4. Edited by W.A. Nierenberg, San Diego, Academic Press, 1991, p.493-502, 11 refs.

The West Antarctic Ice Sheet is a marine ice sheet that includes Antarctica's great ice shelves. The ice sheet is nourished by snow accumulation and ablated dominantly by calving. Enigmatic ice streams are also common. Because marine ice sheets are delicately balanced ice bodies extremely susceptible to climatic and sea level changes, much investigation and interest are directed toward evaluating the history of the sheet and its relationship with the climate and the sea level.

F-45490
Kohnen, H., comp., **Filchner-Ronne Ice Shelf programme, Report 3 (1986),** Bremerhaven, Alfred Wegener Institute for Polar and Marine Research, 1986, 113p., Refs. passim. For individual papers see F-45491 through F- 45508 and J-45509, or 46-2036 through 46-2054.

DLC G890.F55R47

Part of the 2nd International Workshop of the Filchner-Ronne Ice Shelf program, held in Cambridge, England, on June 4-5, 1986, was devoted to outlining the progress made in the program since 1985. This volume contains short preliminary reports of recent investigations made as part of the program.

F-45491
Swithinbank, C., **Ice rises and ice rumples,** Filchner-Ronne Ice Shelf programme, Report 3 (1986), compiled by H. Kohnen, Bremerhaven, Alfred Wegener Institute for Polar and Marine Research, 1986, p.11-14, 3 refs.

DLC G890.F55R47

Ice rises are dome-shaped ice caps grounded on shoals within or at the seaward edge of ice shelves; they are generally ellipsoidal in shape. There are 3 known ice rises on Filchner- Ronne ice shelf: Korff, Henry, and Berkner I. Ice rumples are distinguished by a characteristic crevasse pattern and a rise in the surface. The criterion for distinguishing between ice rumples and an ice rise is the direction of ice movement. Digitally enhanced Landsat images have revealed extensive ice rumples on Filchner Ice Shelf. Some 200 km west of Berkner I., Doake Ice Rumples extend over an irregularly-shaped area with dimensions of about 100 x 30 km.

F-45492
Doake, C.S.M., **Grounding zone of Rutford Ice Stream, Antarctica,** Filchner-Ronne Ice Shelf programme, Report 3 (1986), compiled by H. Kohnen, Bremerhaven, Alfred Wegener Institute for Polar and Marine Research, 1986, p.15-19, 1 ref.

DLC G890.F55R47

A grounding line was first located on Rutford Ice Stream by using tiltmeters. Enhanced Landsat images have since revealed a complex surface morphology for distances up to 100 km downstream which has been interpreted as indicating intermittent grounding. Several radio-echo sounding flights have yielded ice thickness in this area and the echo characteristics help discriminate between areas where the ice is floating and where it is grounded. Features of this part of the ice stream draining from Ellsworth Mountains into Ronne Ice Shelf are described.

F-45493
Jenkins, A., **Flowline on Ronne Ice Shelf,** Filchner-Ronne Ice Shelf programme, Report 3 (1986), compiled by H. Kohnen, Bremerhaven, Alfred Wegener Institute for Polar and Marine Research, 1986, p.20-27, 4 refs.

DLC G890.F55R47

During the 1985/86 season a study was started on the ice movement on Ronne Ice Shelf along a flowline from Rutford Ice Stream grounding line to the ice front. A single stake was placed every 25 km and its position and elevation fixed by a Magnavox MX1502B satellite surveyor. A strain rosette, consisting of a pattern of four stakes, was placed every 50 km. A 10 m temperature was recorded at every site and stake heights were measured for accumulation studies. To enable a more accurate determination of accumulation rate a 5 m core was recovered for oxygen isotope analysis. The preliminary results presented here comprise the 10 m temperatures and surface elevations recorded at each site. (Auth. mod.)

F-45494
Vaughan, D.G., **Glaciological study of the Rutford Ice Stream,** Filchner-Ronne Ice Shelf programme, Report 3 (1986), compiled by H. Kohnen, Bremerhaven, Alfred Wegener Institute for Polar and Marine Research, 1986, p.28-36, 1 ref.

DLC G890.F55R47

The British Antarctic Survey first conducted glaciological fieldwork on the Rutford Ice Stream in 1978-80 when a triangulation scheme was installed in the grounding zone. During the austral summer of 1984/85 a four-man party returned to the Rutford to establish a new triangulation scheme upstream of the first. The new scheme consists of 173 snow and rock stations, with roughly 3 km separation. There is a central longitudinal line 112 km long, lying approximately along a flowline down the glacier. From this branch 3 transverse schemes, which extend across the ice stream into the regions of high shear rate. The most obvious feature on the transverse profiles, which are presented in figures, is a deep trench running down the western side of the ice stream. Preliminary results of mass flux analysis are presented in a table.

F-45495
Kock, H., Wiegand, A., **Glaciological geodesy on Filchner Ice Shelf 1983-86,** Filchner-Ronne Ice Shelf programme, Report 3 (1986), compiled by H. Kohnen, Bremerhaven, Alfred Wegener Institute for Polar and Marine Research, 1986, p.37-42, 4 refs.

DLC G890.F55R47

This geodetic contribution to the glaciological investigation of the Filchner Ice Shelf consists of determining the ice shelf motion and strain behavior. Deformation figures were established in a grid and measured in two expeditions, with a number of redundant observations in order to get high reliability. The ice motion and strain behavior were determined by comparing the coordinate sets of both surveyings.

F-45496
Sievers, J., Grindel, A., **Satellite image maps: an interpretation aid and planning tool for glaciology,** Filchner-Ronne Ice Shelf programme, Report 3 (1986), compiled by H. Kohnen, Bremerhaven, Alfred Wegener Institute for Polar and Marine Research, 1986, p.43-46.

DLC G890.F55R47

The problems of making maps in Antarctica, including the lack of enough ground control, the determination of fixed points and the bridging of vast snow and ice covered areas with no fix point, are discussed. A method with which, in general, it will be possible to overcome some of the problems, and which is based only on digital processing, is outlined.

F-45497
McIntyre, N., **Discharge of ice into the Filchner-Ronne ice shelves,** Filchner-Ronne Ice Shelf programme, Report 3 (1986), compiled by H. Kohnen, Bremerhaven, Alfred Wegener Institute for Polar and Marine Research, 1986, p.47-52, 14 refs.

DLC G890.F55R47

For the calculation of balance discharges and velocities, the antarctic ice sheet was divided into drainage basins contributing to the discharge of ice through 36 major outlet glaciers and ice streams. Of the 36 drainage basins which together drain 59% of the entire ice sheet, 9 discharge into the Filchner-Ronne ice shelf system. These are listed in a table along with flux and velocity estimates.

F-45498
Graf, W., **Ice core studies on the Filchner-Ronne Ice Shelf,** Filchner-Ronne Ice Shelf programme, Report 3 (1986), compiled by H. Kohnen, Bremerhaven, Alfred Wegener Institute for Polar and Marine Research, 1986, p.53-57, 2 refs.

DLC G890.F55R47

During the 1983/84 field season on the Filchner-Ronne Ice Shelf, an extended glaciological program was carried out comprising snow pit studies along the Filchner-I-Traverse and ice core drilling at grid point 340, at a distance of 220 km from the ice edge. This paper presents preliminary results of the analysis of the O-18 content of this core, carried out to get information about the structure of the ice shelf.

F-45499
Peel, D.A., **Ice core drilling on Dolleman Island,** Filchner-Ronne Ice Shelf programme, Report 3 (1986), compiled by H. Kohnen, Bremerhaven, Alfred Wegener Institute for Polar and Marine Research, 1986, p.58-61.

DLC G890.F55R47

Drilling activities on Dolleman I. in 1986 formed part of a continuing program to study the past climate of the Antarctic Peninsula. The aim is to reconstruct a palaeoclimatic record which will help to connect similar records from the interior of the ice sheet with those from lower latitudes. Dolleman I., which is situated on the east coast of the peninsula, has a pseudo- continental climatic regime dominated by persistent sea ice in the Weddell Sea and the influence of cold, stable winds draining across the Ronne Ice Shelf from the interior of the continent. It is expected that climatic records from the site will relate closely to those from the Ronne and Filchner ice shelves. The site satisfies several important criteria for deeper drilling: it is a symmetrical dome feature with a maximum ice depth of about 460 m. It is expected that a core drilled to bedrock will yield a datable time series through more than 1000 years.

F-45500
Paren, J.G., Cooper, S., **George VI Ice Shelf: a temperate ice shelf,** Filchner-Ronne Ice Shelf programme, Report 3 (1986), compiled by H. Kohnen, Bremerhaven, Alfred Wegener Institute for Polar and Marine Research, 1986, p.62-63.

DLC G890.F55R47

George VI Ice Shelf on the west coast of the Antarctic Peninsula is unusual: unlike other ice shelves which are underlain by sea water barely above freezing, the sea water under the ice shelf is up to 3 deg above freezing. The thermal regime of this ice shelf is being studied, as is the oceanographic circulation beneath it. It is found that heat from the sea and from the percolation of meltwater at the upper surface progressively warms the ice shelf. At mid-depth, the coldest level in the ice shelf, the recorded temperatures were -6 C off Moore Point, -4 C off Carse Point and, near the northern ice front, between -1.6 C and -1.8 C, depending on the time of year.

F-45501
Orheim, O., **Glaciological research on the Norwegian Antarctic Research Expedition (NARE) 1984/85,** Filchner-Ronne Ice Shelf programme, Report 3 (1986), compiled by H. Kohnen, Bremerhaven, Alfred Wegener Institute for Polar and Marine Research, 1986, p.64-67.

DLC G890.F55R47

The NARE glaciological research relevant to the Filchner- Ronne Ice Shelf program included developments in use of Landsat thematic mapper and multispectral scanner images to map surface features and ice flow in Queen Maud Land, and studies of calving and underwater melting of ice fronts in the Weddell Sea area.

F-45502
Garrett, S.W., **New aeromagnetic and bedrock elevation data from the area around Haag Nunataks, West Antarctica,** Filchner-Ronne Ice Shelf programme, Report 3 (1986), compiled by H. Kohnen, Bremerhaven, Alfred Wegener Institute for Polar and Marine Research, 1986, p.68-71, 2 refs.

DLC G890.F55R47

During the 1983-84 season of the joint BAS-USAP investigation of the tectonic evolution of West Antarctica, 5000 km of data were retrieved from the area between the Antarctic Peninsula and the Ellsworth Mountains, at the head of Ronne Ice Shelf, including ice thickness information and magnetic measurements. The bedrock topography map confirms that Rutford Ice Stream, Carlson Inlet, and Evans Ice Stream occupy linear depressions with steep escarpments. Between the ice streams are blocks showing elevations between -500 m and 500 m. The dramatic bedrock topography may indicate that much of the rifting associated with the formation of the troughs now occupied by the ice streams occurred during the Cenozoic.

F-45503
Herrod, L.D.B., **Sea bottom topography beneath Ronne Ice Shelf, Antarctica,** Filchner-Ronne Ice Shelf programme, Report 3 (1986), compiled by H. Kohnen, Bremerhaven, Alfred Wegener Institute for Polar and Marine Research, 1986, p.72-80, 20 refs.

DLC G890.F55R47

Bedrock elevation data were collected during oversnow geophysical traverses in summers of 1982-83 and 1983-84, totalling 3,500 km and ranging across the ice shelf from Ronne Ice Front to the Ellsworth Mountains. The new data are combined with data previously collected on bedrock elevations and oversnow ice thickness measurements over the grounded ice areas. The combined data set has been contoured, and a figure revealing, for the first time, details of the bedrock surface beneath the Ronne Ice Shelf is presented. In addition, analysis of the seismic movement at each station has allowed an independent estimate of the total ice thickness over the central area where thin ice was first reported by Robin et al. (1983).

F-45504
Thyssen, F., **Central part of the Filchner-Ronne Ice Shelf,** Filchner-Ronne Ice Shelf programme, Report 3 (1986), compiled by H. Kohnen, Bremerhaven, Alfred Wegener Institute for Polar and Marine Research, 1986, p.81-83.

DLC G890.F55R47

Aerial measurements in 1983/84 showed that the electromagnetic reflection soundings (EMR) did not give the correct ice thickness in the central part of the Filchner-Ronne Ice Shelf. This is indicated in an enclosed figure. In 1985/86 a group of researchers was successful in penetrating the central part of the Filchner-Ronne Ice Shelf by a melt borehole, giving an ice thickness of 465 m in this area. Its location is indicated in another enclosed figure. Thus the ice thickness, as deduced by additional aerial measurements and the borehole results, is near 460 m and not 200 m as deduced from electromagnetic reflections only.

F-45505
Pedley, M., Paren, J.G., Potter, J.R., **Tidal spectrum underneath antarctic ice shelves,** Filchner-Ronne Ice Shelf programme, Report 3 (1986), compiled by H. Kohnen, Bremerhaven, Alfred Wegener Institute for Polar and Marine Research, 1986, p.84.

DLC G890.F55R47

A year-long tidal record has been obtained from beneath George VI Ice Shelf; an unusual feature of the record is a significant response in tidal species 3 to 7. These harmonics are practically absent from records further north on the west coast of the Antarctic Peninsula, but are present in all tidal height records from George VI Sound. A strong ter-diurnal signal also exists in the tidal currents under the ice shelf. An anelastic component in the deformation of the ice at the grounding line is tentatively proposed as the mechanism responsible.

F-45506

Smith, A.M., **Ice rumples between Korff and Henry ice rises,** Filchner-Ronne Ice Shelf programme, Report 3 (1986), compiled by H. Kohnen, Bremerhaven, Alfred Wegener Institute for Polar and Marine Research, 1986, p.85-90, 4 refs.

DLC G890.F55R47

The Doake Ice Rumples are a grounded area of ice of approximately 2300 sq km between Korff and Henry ice rises. Unlike ice rises, which generally exhibit independent flow regimes, ice rumples merely reduce ice shelf flow. Ice flow over the Doake Ice Rumples is important to the flow regime of the whole of Ronne Ice Shelf. Together with Korff and Henry ice rises they restrict the flow of much of the ice entering the southern part of the ice shelf to less than half the ice shelf width. To investigate this flow a stake scheme was established over the Doake Ice Rumples in 1983. Ice surface and basal topography over the Doake Ice Rumples are shown.

F-45507

Lange, M.A., MacAyeal, D.R., **Finite element modelling of the Filchner-Ronne Ice Shelf,** Filchner-Ronne Ice Shelf programme, Report 3 (1986), compiled by H. Kohnen, Bremerhaven, Alfred Wegener Institute for Polar and Marine Research, 1986, p.91-101, 8 refs.

DLC G890.F55R47

Finite element models of the Filchner-Ronne Ice Shelf are presented. The major aim of this study is to evaluate different ice thickness distributions in the light of presently available field data. Radio-echo data of two German expeditions (1983/84 and 1985/86) led to the hypothesis that a previously accepted ice thickness map might be incorrect. In particular, the new data seemed to indicate that the earlier mapped thin ice regions in the central parts of the Ronne Ice Shelf may actually be much thicker. The supposed bottom signals in the thin ice regions are now believed to indicate the interface between regular ice and an as yet undefined (possibly saline) ice layer. The differences between the newly proposed ice thicknesses and earlier estimates are found to be sufficient to alter the dynamic regime of the ice shelf and should be discernible in numerical models.

F-45508

Herterich, K., **On the flow within the transition zone between ice sheet and ice shelf,** Filchner-Ronne Ice Shelf programme, Report 3 (1986), compiled by H. Kohnen, Bremerhaven, Alfred Wegener Institute for Polar and Marine Research, 1986, p.102-106, 2 refs.

DLC G890.F55R47

The flow within the transition zone between ice sheet and ice shelf located around the grounding line has been derived from the force balance and flow in two dimensions. For simplicity, temperature and density were assumed to be homogenous. The main results are: in all cases investigated so far, the transition flow is increasing downstream with large flow gradients around the grounding line; the width of the transition zone is of the order of the ice thickness, with higher values in the case of basal sliding; the vertical and horizontal structure within the transition zone, although of glaciological significance, do not affect the vertically integrated mass balance very much. (Auth.)

F-45514

Miller, H., ed, **Filchner-Ronne Ice Shelf programme, Report 4 (1990),** Bremerhaven, Alfred Wegener Institute for Polar and Marine Research, 1990, 135p., Refs. passim. For individual papers see 46-2121 through 46- 2142 or F-45515 through F-45536.

DLC G890.F55R47

This volume contains summaries of papers presented at the 3rd, 4th and 5th International Workshop of the Filchner-Ronne Ice Shelf program held in Oslo on June 13-14, 1988; in Bremerhaven on June 22-23, 1989; and in Cambridge on June 27-28, 1990, respectively. The papers include preliminary results of recent investigations made as part of the program, and plans for future work.

F-45515

Jenkins, A., **Glaciological fieldwork on Ronne Ice Shelf, 1985-88: some preliminary results,** Filchner-Ronne Ice Shelf programme, Report 4 (1990), edited by H. Miller, Bremerhaven, Alfred Wegener Institute for Polar and Marine Research, 1990, p.7-11, 5 refs.

DLC G890.F55R47

During the 1985/86 and 1986/87 field seasons a widely spaced stake scheme was established along a flowline on Ronne Ice Shelf extending from the Rutford Ice Stream grounding line to the ice front. The scheme was revisited and resurveyed during the 1987/88 season. The complete data set comprises 28 sites with known velocity, ice thickness, surface elevation, surface temperature and accumulation rate. In addition, at 17 of the sites strain rates and rotation rates are also known.

F-45516

Jenkins, A., **Recent investigations of surface undulations where Rutford Ice Stream enters Ronne Ice Shelf,** Filchner-Ronne Ice Shelf programme, Report 4 (1990), edited by H. Miller, Bremerhaven, Alfred Wegener Institute for Polar and Marine Research, 1990, p.12-17, 3 refs.

DLC G890.F55R47

Downstream of the grounding line on Rutford Ice Stream a distinctive pattern of surface undulations extends more than 150 km into the ice shelf. The troughs are up to 30 m deep and correspond to areas of thinner ice which are characterized by complex basal radar reflections. This and the fact that surface elevations in these depressions are above those required for hydrostatic equilibrium, initially led to the conclusion that these areas were grounded. However, comparison of a 1986 SPOT image of the area with a 1974 Landsat image revealed that the topographic features are moving with the ice shelf. Detailed studies of some of the most prominent features were undertaken during the 1987/88 field season. These included the measurement of surface elevation and ice thickness along a number of profiles which were accurately fixed by Magnavox.

F-45517

Hinze, H., **Ice velocity, flow line, and deformation determination from GPS and Transit at Filchner Ronne Ice Shelf,** Filchner-Ronne Ice Shelf programme, Report 4 (1990), edited by H. Miller, Bremerhaven, Alfred Wegener Institute for Polar and Marine Research, 1990, p.18-31, 12 refs.

DLC G890.F55R47

Two satellite systems, the Transit or Navy Navigation Satellite System (NNSS) and the Global Positioning System— Navigation System with Time and Ranging (NAVSTAR/GPS), are compared in terms of satellite positioning and working features. It is suggested that the GPS allows a faster, more precise and continuous position determination than the Transit—NNSS. To achieve similar position accuracy for absolute coordinates as well as for relative, the two systems require an observation span of 1/2 to 1 day with NNSS and 1/2 to 1 hour with GPS. It is pointed out that the GPS satellite configuration, as it is today, is limited in such a manner that only during special hours, depending on the geographic location of the user, is satellite positioning possible during a window of radio visibility.

F-45518

Graf, W., Reinwarth, O., Moser, H., **520 year temperature record of a 100 m core from the Ronne Ice Shelf, Antarctica (extended abstract),** Filchner-Ronne Ice Shelf programme, Report 4 (1990), edited by H. Miller, Bremerhaven, Alfred Wegener Institute for Polar and Marine Research, 1990, p.41-45, 4 refs.

DLC G890.F55R47

Indications for climatic changes during the last 520 years were inferred from the O-18 contents of a 100 m ice core from the Ronne Ice Shelf. The core was drilled during the 1983/84 season by a German antarctic field party at point 340 (55.4E, 78.6S) and dated using the seasonal variations of the O-18 contents. It spans a time of 520 years and dates back to 1461 A.D. The O-18 time series, derived from the O-18 profile, reflects first of all the decrease of O-18 content in the catchment area of the core extending from the drilling site 250 km to the south and shows, secondly, a large scatter from year to year. For a climatological interpretation, the O-18 series has to be corrected for continental effects on the delta O-18 values.

F-45519

Graf, W., Reinwarth, O., Oerter, H., Diurgerov, M., **Isotopic and stratigraphical interpretation of a 16 m firn core nearby Druzhnaya I (extended abstract),** Filchner-Ronne Ice Shelf programme, Report 4 (1990), edited by H. Miller, Bremerhaven, Alfred Wegener Institute for Polar and Marine Research, 1990, p.46-49, 4 refs.

DLC G890.F55R47

During Feb. 1986, approximately 2.5 km south of the Soviet summer station Druzhnaya I, the wall of a 5 m deep snowpit was sampled at intervals of 5 cm, and from the bottom of the snowpit a firn core was drilled to 16 m depth. For analysis, the core was later subsampled in 2.4 cm intervals in the laboratory. Stratigraphical features (grain size, wind and ice crusts, density) and the temperature of the firn were determined. The density increases from 0.400 at 1 m depth to 0.600 g/cu cm at 16 m depth. The temperature profile reveals temperatures decreasing from -11.0 C to -24.5 C and a 10 m temperature of -24.0 C. The ratio of the stable isotopes of hydrogen and oxygen, the H-3 content and the electrolytical conductivity of the melted samples were determined. The analytical results together with the calculated deuterium excess are shown. The mean accumulation rate for the period 1952- 1985 was calculated to be 24 cm WE, with a relative large standard deviation of 6 cm WE. The accumulation rates show a decrease, significant on a 95% confidence level, from 1952 to 1985 with 0.23 cm WE per year.

F-45520

Vaughan, D.G., **Preliminary results of British Antarctic Survey fieldwork on Ronne Ice Shelf 1988/89,** Filchner-Ronne Ice Shelf programme, Report 4 (1990), edited by H. Miller, Bremerhaven, Alfred Wegener Institute for Polar and Marine Research, 1990, p.50-51, 3 refs.

DLC G890.F55R47

To provide realistic input values for medium scale modelling, or valuable testing data for larger scale modelling of the Ronne Ice Shelf, it was proposed to establish 12 strain rosettes in the region. Logistical limitations dictated that this figure be reduced to 6. The most important 6 sites were visited during the 1988/89 season, and strain rosettes and geoceiver stations installed at each. It is hoped that the survey markers used will remain visible for at least two years and that at least one revisit will be possible. Remeasurement of the exposed lengths of the survey markers will provide a measurement of the local accumulation at each site, another important parameter in the input required for modelling.

F-45521

Jenkins, A., **Ice—ocean interaction on Ronne Ice Shelf, Antarctica**, Filchner-Ronne Ice Shelf programme, Report 4 (1990), edited by H. Miller, Bremerhaven, Alfred Wegener Institute for Polar and Marine Research, 1990, p.52-54, 3 refs.

DLC G890.F55R47

Detailed glaciological measurements have been made at 28 sites lying on an approximate flowline extending 760 km across Ronne Ice Shelf from the grounding line of Rutford Ice Stream. Doppler satellite surveying has enabled ice velocities and surface elevations to be calculated at each site, and at 17 of them ice deformation rates have been derived from repeated measurements of local stake networks. Calculations indicate basal melting in excess of 1 m/a over the first 100 km of the flowline downstream of Rutford Ice Stream. Melting continues at a lesser rate over the next 200 km before freezing commences. Freezing then dominates up to the final 100 km before the ice front, resulting in the accumulation of a layer of saline ice up to 40 m thick. This is rapidly removed as melt rates increase to over 6 m/a at the ice front. Profiles of ice shelf thickness and sea-bed topography are illustrated.

F-45522

Möller, D., Ritter, B., **Glacial geodetic investigations on Filchner-Ronne Ice Shelf 1989/90,** Filchner-Ronne Ice Shelf programme, Report 4 (1990), edited by H. Miller, Bremerhaven, Alfred Wegener Institute for Polar and Marine Research, 1990, p.55-59.

DLC G890.F55R47

The data required for the modelling of melting rates of the ice near a projected borehole at 77S-52.5W are outlined. As heights above sea level are available only at a very few points near the ice front, and cannot be derived by satellite positioning, two height profiles along flowlines are projected and shown in a figure.

F-45523

Bamber, J., **ERS-1 altimeter activities in Antarctica,** Filchner-Ronne Ice Shelf programme, Report 4 (1990), edited by H. Miller, Bremerhaven, Alfred Wegener Institute for Polar and Marine Research, 1990, p.60-61, 2 refs.

DLC G890.F55R47

A brief resume is given of previous ice sheet altimetric studies undertaken by the Mullard Space Science Laboratory (MSSL) over the Larsen ice shelf, using Seasat data to indicate the potential of the instrument. Some details of the ERS-1 mission are given, including orbit scenarios, instrument and product details. The altimeter ice sheet validation requirements are discussed. (Auth.)

F-45524

Paren, J.G., **Unmanned submersibles: the development of AUTOSUB within NERC, UK,** Filchner-Ronne Ice Shelf programme, Report 4 (1990), edited by H. Miller, Bremerhaven, Alfred Wegener Institute for Polar and Marine Research, 1990, p.62-65.

DLC G890.F55R47

In 1987 a five year program was approved by the UK Natural Environment Research Council (NERC) to develop an unmanned autonomous submersible craft (AUTOSUB) for oceanographic research. AUTOSUB would be required to do new work, impossible using conventional techniques, providing opportunities for the Filchner- Ronne Ice Shelf program. Specifications for an under-ice AUTO-

SUB have been sketched out with the Scott Polar Research Institute and the British Antarctic Survey; the specification agreed upon is outlined.

F-45525

Hambrey, M.J., **Contemporary and Cenozoic glaciomarine processes of Antarctica: the Filchner-Ronne Ice Shelf,** Filchner-Ronne Ice Shelf programme, Report 4 (1990), edited by H. Miller, Bremerhaven, Alfred Wegener Institute for Polar and Marine Research, 1990, p.66-67.

DLC G890.F55R47

The sedimentological aspects of ice shelf studies, the geological importance of glaciomarine sediments and ice shelf work required to address sedimentological problems are briefly reviewed. A proposal currently under review by the UK Natural Environment Research Council is outlined, involving collaboration between German and British marine geologists, geophysicists, and glaciologists, with the aim to investigate by means of shallow coring and geophysical surveying the area off the Ronne Ice Shelf.

F-45526

Graf, W., Wagenbach, D., **Glaciological data,** Filchner-Ronne Ice Shelf programme, Report 4 (1990), edited by H. Miller, Bremerhaven, Alfred Wegener Institute for Polar and Marine Research, 1990, p.68-72, 8 refs.

DLC G890.F55R47

Compilation of data on snow- and firn densities, accumulation rates and snow chemistry from the Filchner-Ronne Ice Shelf, Ekström Ice Shelf and Ritscher Upland is reported. Results are presented in tables and in figures. The data are based on snowpit samples, shallow firn cores (typically drilled to 10 m depth) and ice cores (drilled to depths greater than 20 m). The densities of the snowpit samples were determined by density probes 6 cm in diameter, that of the cores by weighting core samples up to 80 cm in length. The snow and firn were dated using the seasonal variation of stable isotope ratio (H-2/H-1 and O-18/O-16).

F-45527

Hinze, H., **Glaciological data: geodetic measurements,** Filchner-Ronne Ice Shelf programme, Report 4 (1990), edited by H. Miller, Bremerhaven, Alfred Wegener Institute for Polar and Marine Research, 1990, p.73.

DLC G890.F55R47

A list of publications is given of studies on the Filchner- Ronne Ice Shelf velocities and strains, surface elevation and geoidal models.

F-45528

Sievers, J., **Glaciological satellite image map series Filchner-Ronne- Schelfeis 1:2,000,000,** Filchner-Ronne Ice Shelf programme, Report 4 (1990), edited by H. Miller, Bremerhaven, Alfred Wegener Institute for Polar and Marine Research, 1990, p.84-85.

DLC G890.F55R47

The concept of a cooperative cross-disciplinary project has been developed to publish a series of thematic satellite image and line maps of Filchner-Ronne Ice Shelf at 1:2 million scale. The participating disciplines and collaborators are listed.

F-45529

Sievers, J., **Two thematic satellite image maps of Filchnerschelfeis at 1:250,000 scale,** Filchner-Ronne Ice Shelf programme, Report 4 (1990), edited by H. Miller, Bremerhaven, Alfred Wegener Institute for Polar and Marine Research, 1990, p.86-87.

DLC G890.F55R47

In continuation of a research program for antarctic thematic mapping conducted at the Institut für Angewandte Geodäsie, two satellite image maps have been published. They are the experimental result of preserving the image character of the satellite imagery in the maps and of enhancing the thematic glaciological information content by graphical elements.

F-45530

Heidrich, B., Sievers, J., Thiel, M., Schenke, H.W., **Digital Antarctic Coastline: a project of topographic- glaciological interpretation and digitisation of the coastal region of Weddell Sea,** Filchner-Ronne Ice Shelf programme, Report 4 (1990), edited by H. Miller, Bremerhaven, Alfred Wegener Institute for Polar and Marine Research, 1990, p.88-90.

DLC G890.F55R47

An outline is presented of a project of topographic interpretation and digitization of the coastal region of western New Schwabenland, Coats Land and Filchner-Ronne Ice Shelf; the outlined area is shown in a sketch. Some 80 Landsat-MSS scenes are being used to interpret the imagery. The interpretation is based on an object catalogue comprising topographic-glaciological features listed in this report.

F-45531

Bamber, J.L., Ridley, J.K., Mantripp, D.R., **MSSL Science Plan: calibration and validation of satellite remote sensing data over polar regions,** Filchner-Ronne Ice Shelf programme, Report 4 (1990), edited by H. Miller, Bremerhaven, Alfred Wegener Institute for Polar and Marine Research, 1990, p.91-97, 6 refs.

DLC G890.F55R47

MSSL's aim is to provide an improved understanding of the microwave (and infrared) behavior of snow so that remote sensing data over snow-covered surfaces can be exploited with maximum benefit. In the pursuit of this objective, it is planned to undertake comprehensive measurements of relevant surface and sub- surface parameters characterizing the microwave response. These data will be used as inputs for modelling the dielectric and scattering behavior of snow. Results of this procedure will be compared with data from ERS-1 and other remote sensing satellites, and used to provide a more complete description of the spatial and temporal variation of surface snow conditions. They will also improve the accuracy of existing measurement techniques such as elevation and mass balance estimates from altimeter data. It is intended that this work will be of considerable benefit to the Filchner-Ronne Ice Shelf program. A topographic map of the ice shelves will be produced with anticipated elevation accuracy of better than 1 m. (Auth. mod.)

F-45532

Oerter, H., **Glaciological work at Filchner-Ronne ice shelves during the 1989/1990 field season,** Filchner-Ronne Ice Shelf programme, Report 4 (1990), edited by H. Miller, Bremerhaven, Alfred Wegener Institute for Polar and Marine Research, 1990, p.98-103, 3 refs.

DLC G890.F55R47

From Jan. 4 through Feb. 18, 1990, a ground program was carried out on the Filchner-Ronne ice shelves, including ice core drilling and hot water drilling at the drill camp site, as well as geodetic measurements, radio echo soundings, snow-pits and 10 m cores along a traverse route. In this report, a summary is given of the activities concerned with ice core drilling and glaciological field work. The radio echo sounding program and hot water drilling program are described separately in this volume.

F-45533
Blindow, N., **Structures and dielectric properties of meteoric and marine ice in the central part of the Filchner-Ronne Ice Shelf,** Filchner-Ronne Ice Shelf programme, Report 4 (1990), edited by H. Miller, Bremerhaven, Alfred Wegener Institute for Polar and Marine Research, 1990, p.104-108, 1 ref.

DLC G890.F55R47

Ground based electromagnetic reflection (EMR) measurements using a 40 MHz monopulse sounder with high resolution were carried out in the central part of the Filchner-Ronne Ice Shelf (FRIS) during an oversnow traverse of the German FRIS Expedition, 1989/90. In this area, a basal layer of marine ice with thickness up to 400 m was revealed by aerogeophysical measurements. Between the western and eastern part, the meteoric ice has a minimum thickness of less than 100 m, and the interface meteoric/marine exhibits a complicated and irregular structure on both sides of this minimum.

F-45534
Grosfeld, K., **Temperature profiles and investigation of the ice-shelf/ocean boundary using hot water drilled holes: report of field work on FRIS 1989/90,** Filchner-Ronne Ice Shelf programme, Report 4 (1990), edited by H. Miller, Bremerhaven, Alfred Wegener Institute for Polar and Marine Research, 1990, p.109-111, 1 ref.

DLC G890.F55R47

During the German FRIS field season of 1989-1990, several hot water drill-holes were made in the Filchner-Ronne Ice Shelf with intent to investigate the temperature-depth profile and the bottom melting rate. The drilling equipment and method used are described. Using the hot water drilling technique, access was gained to the sea underneath the ice shelf; initial measurements were taken. It is expected that re-measurements in two or three years will yield a reliable melting rate to an accuracy of 0.2 m.

F-45535
Jenkins, A., **One-dimensional model of ice shelf-ocean interaction,** Filchner-Ronne Ice Shelf programme, Report 4 (1990), edited by H. Miller, Bremerhaven, Alfred Wegener Institute for Polar and Marine Research, 1990, p.112-119, 18 refs.

DLC G890.F55R47

Results from a one-dimensional model of ice shelf-ocean interaction have been presented, which show good agreement with previous observations made on Ronne Ice Shelf. These results illustrate the role played by the ice shelf basal gradient in controlling the flow of Ice Shelf Water and hence in modifying the distribution and rate of basal accumulation and ablation. There are potential instabilities in the system: increased melting near the grounding line of an ice shelf will increase the basal gradient, which will lead to a further increase in basal melting in a positive feedback loop. Such effects can only be investigated with the help of a model describing the complete ice shelf-ocean system. Coupling of this one-dimensional oceanographic model to an ice shelf flowline model seems to be a realizable goal.

F-45536
Orheim, O., **Glaciologic and oceanographic studies on Fimbulisen during NARE 1989/90,** Filchner-Ronne Ice Shelf programme, Report 4 (1990), edited by H. Miller, Bremerhaven, Alfred Wegener Institute for Polar and Marine Research, 1990, p.120-131, 8 refs.

DLC G890.F55R47

The objective of this program was to investigate the processes taking place underneath an ice shelf. Fimbul Ice Shelf, which is 130 km wide, was selected because it has a size similar to many of the ice shelves around Antarctica. The main effort was to drill through the inner part of the Fimbul Ice Shelf, conduct under-ice sampling, and deploy sub-ice instrumentation. Installing the instruments required a hole with a 0.2 m working diameter that could be guaranteed for many hours. The field work and some preliminary results are described.

F-45538
Jacobs, S.S., **Voyage of iceberg B-9,** *American scientist,* Jan.-Feb. 1992 Vol.80, p.32-42, 21 refs.

Iceberg B-9 broke off from the Ross Ice Shelf in Oct. 1987 at a shelf indentation known since 1908 as the Bay of Whales. It was initially 154 km long (size of Long Island) with a deep keel which caused it to drift with deep sub-surface currents rather than with the surface winds. An Argos system transmitter was dropped on B-9 and locked in to TIROS, enabling precise, continuous tracking. The twists and turns of the drift course are discussed and some of the unknowns of its voyage are noted; specifically, it is not easily determined if an iceberg is grounded or beset in the pack. B-9 has broken into three sections, B-9a, b, and c. B-9c is the smallest segment and appears to be trapped behind B-9b near Cape Hudson on the George V Coast. All three pieces were sighted in the fall, 1991.

F-45542
Forster, R.R., Davis, C.H., Rand, T.W., Moore, R.K., **Snow-stratification investigation on an antarctic ice stream with an X-band radar system,** *Journal of glaciology,* 1991 37(127), p.323-325, 11 refs.

An X-band FM-CW radar was used to determine the feasibility of observing annual snow accumulation layers in Antarctica with a high-resolution inexpensive radar system. The formation of layering boundaries, their resultant electromagnetic discontinuity and their detection by reflected energy are presented. Large returns from depths corresponding to reasonable positions for annual layers were found. The average accumulation rates calculated from the radar returns agree with those measured in a previous pit study done in the same area. The detection of the annual accumulation layers with this system implies a simple, inexpensive mobile radar could be used to profile large areas, allowing the distorting effects of local topography to be removed. This type of system with a concurrent pit study could provide insight into the effect of sub-surface strata on spaceborne or airborne microwave remote sensing. (Auth.)

F-45543
Tison, J.L., Morris, E.M., Souchez, R.A., Jouzel, J., **Stratigraphy, stable isotopes and salinity in multi-year sea ice from the rift area, south George VI Ice Shelf, Antarctic Peninsula,** *Journal of glaciology,* 1991 37(127), p.357-367, 23 refs.

Results from a detailed profile in a 5.54 m multi-year sea-ice core from the rift area in the southern part of George VI Ice Shelf are presented. Stratigraphy, stable isotopes and Na content are used to investigate the growth processes of the ice cover and to relate them to melting processes at the bottom of the ice shelf. The thickest multi-year sea ice in the sampling area appears to be second-year sea ice that has survived one melt season. Combined salinity/stable-isotope analyses show large-scale sympathetic fluctuations that can be related to the origin of the present water. Winter accretion represents half of the core length and mainly consists of frazil ice of normal sea-water origin. However, five major dilution events of sea water, with freshwater input from the melting base of the ice shelf reaching 20% on two occasions, punctuate this winter accretion. Two of them correspond to platelet-ice production, which is often related to the freezing of ascending supercooled water from the bottom of the ice shelf. Brackish ice occurs between 450 and 530 cm in the core. It is demonstrated that this results from the freezing of brackish water (Jeffries and others, 1989) formed by mixing of normal sea water with melted basal shelf ice, with dilution percentages of maximum 80% fresh water. (Auth.)

F-45544

Goodwin, I.D., **Snow-accumulation variability from seasonal surface observations and firn-core stratigraphy, eastern Wilkes Land, Antarctica,** *Journal of glaciology,* 1991 37(127), p.383-387, 7 refs.

Annual accumulation records were derived from two firn cores drilled in eastern Wilkes Land. The accumulation records, spanning the period 1930-85, show that annual accumulation has increased by 25% from 1960 to 1985, resulting in the highest accumulation rates in the 55 year records. Annual accumulation layers were identified in the firn cores using a firn-stratigraphic model (based on the observed characteristics and variability of the seasonal snow- surface layer), together with seasonal oxygen-isotope ratios. The accumulation records support other evidence for a similar recent increase across Antarctica. The greater increase over the long- term mean for 1930-85 in eastern Wilkes Land was observed on a northeast aspect slope near Terre Adélie. It is suggested that the increase is the result of changes in the general atmospheric circulation pattern which have produced a higher annual frequency of precipitation events. (Auth. mod.)

F-45545

Humphrey, N., **Estimating ice temperature from short records in thermally disturbed boreholes,** *Journal of glaciology,* 1991 37(127), p.414-419, 7 refs.

A technique to estimate undisturbed ice temperature is discussed for sensors placed in boreholes that have been heated to the melting point during drilling, and for which only a limited time span of temperature record is available. A short temperature record after the hole refreezes commonly results when using hot- water or steam drills, where measurements are constrained by logistics, ice deformation, sensor drift or other problems, or where the refreezing time is long because of near-freezing ice temperatures or large hole sizes. Short data records are also typical in ongoing drilling programs where temperature information may be necessary for the program itself. It is shown that estimates of undisturbed temperatures can be made from records of temperature that extend only marginally beyond the initial refreezing. Complex effects of hole size, heating history, and the thermodynamic and geometrical effects of a moving boundary (the freezing borehole walls) are important to temperature decay immediately after freeze-up, so that the standard technique of comparing temperature decay to an inverse of time model is not applicable, and comparison has to be made to a numerical model of heat flow to a refreezing borehole. Data from Ice Stream B, Antarctica, are compared to the numerical model to illustrate the technique. Data are also compared to simpler (inverse time) thermal models, and a potential for error is pointed out, since a short data record can be spuriously matched with the simpler one or two free-parameter models. (Auth. mod.)

F-45549

Anderson, J.B., Kennedy, D.S., Smith, M.J., Domack, E.W., **Sedimentary facies associated with Antarctica's floating ice masses,** *Geological Society of America. Special paper,* 1991 No.261, Glacial marine sedimentation; paleoclimatic significance. Edited by J.B. Anderson and G.M. Ashley, p.1-25, 51 refs.

The largest floating ice masses of Antarctica are the Ross, Ronne-Filchner, and Amery ice shelves, which are the floating extensions of the ice sheet and occur at the confluence of large ice streams. In the Ross Sea, surface sediments consist of diatomaceous glacial marine sediments. These sediments are relatively thin over most of the continental shelf, where they rest in sharp contact on basal tills. Transitional glacial marine sediments are rare, and basal tills grade offshore into bioclastic carbonates. These stratigraphic relations imply that the ice sheet was fully grounded on the shelf during the last glacial maximum, and that seaward of this expanded ice sheet the sea floor was starved of terrigenous sediment. The retreat of the ice sheet from the continental shelf was so rapid that sub-ice shelf sediments were not deposited. Rapid retreat is expected within a foredeepened shelf setting. Fringing ice shelves represent the second most extensive bodies of floating glacial ice in Antarctica. The Larsen Ice Shelf has associated with it an extensive diamicton facies. These diamictons are overlain by predominantly terrigenous glacial marine sediments whose grain size shows clear influence of marine currents on sedimentation. The third type of ice shelf setting studied (the George VI Ice Shelf) is confined by valley walls. It is the only one of the three examples studied in which an ice shelf recessional lithofacies is clearly recognized. This lithofacies is composed of transitional glacial marine sediments that grade upward into terrigenous muds, which are inferred to be derived from subglacial meltwater outflow. The sub-ice shelf facies is overlain by diatomaceous muds and oozes, which indicates open-marine conditions. Ice tongues, while small in size, represent a significant mode of ice drainage from the antarctic continent. The two examples studied include the shelf areas adjacent to the Drygalski Ice Tongue and the Mertz and Ninnis Ice Tongues. Marine facies associated with ice tongues contain a large biogenic compound, which is primarily siliceous. (Auth. mod.)

F-45566

Wadhams, P., **Atmosphere-ice-ocean interactions in the Antarctic,** Antarctica and global climatic change, edited by C.M. Harris and B. Stonehouse, London, Boca Raton, FL, Bellhaven Press, Lewis Publishers, 1991, p.65-81, 24 refs.

The seasonal variability of the sea ice cover in the Antarctic is one of the most climatically important features of the Southern Hemisphere. The variation is from 4 million sq km in summer to 20 million sq km in winter, and the most recent examination of the data suggests that the seasonally corrected extent has varied about a constant level since 1981. The main features of the seasonal cycle are shown for a typical recent year. The presence of a sea ice cover has an enormous effect on the exchanges of heat, moisture and momentum between ocean and atmosphere; and the motion of the sea ice modifies water masses both in the region of generation and in the region of melt which may be hundreds or thousands of kilometers away. Since the antarctic sea ice and its huge seasonal cycle are of central importance to the climate and energy budgets of the southern ocean, it is vital to understand the mechanisms leading to ice formation, transport and melt. Differences in structure and formation between arctic and antarctic ice are given and the terms first-year and multi-year ice, snow loading, and pressure ridging are defined. Other facets of sea ice are briefly described: coastal polynyas, interactions between climatic change and antarctic sea ice, remote sensing of antarctic sea ice, bottom water production, and sea ice biology.

F-45569

Sugden, D.E., **Stepped response of ice sheets to climatic change,** Antarctica and global climatic change, edited by C.M. Harris and B. Stonehouse, London, Boca Raton, FL, Bellhaven Press, Lewis Publishers, 1991, p.107-114, 25 refs.

The purpose of this paper is to suggest that topography brings non-linearities into the process of ice sheet growth and decay. It introduces thresholds of stability and instability which cause a stepped response to climatic change. This type of behavior has long been postulated on the basis of field evidence, and is readily modelled when detailed topography is included as a boundary condition. This conclusion is important when predicting the response of the antarctic ice sheet to climatic change. It implies that any change in ice extent or its effect on global sea level may not be regular but stepped. This is particularly possible in the case of the west antarctic ice sheet, a marine ice sheet which is prone to calving instabilities. It also implies that it is necessary to introduce the unique topography beneath the ice sheet in a modelling strategy designed to identify any thresholds of instability. (Auth.)

F-45606
Stroh, M., **In Antarctica, scientists go with the floe,** *Science news,* Feb. 22, 1992 141(8), p.119.

This brief report announces the start of a joint U.S.- Russian effort to study the long-neglected northwestern sector of the Weddell Sea. A station has been established on an ice floe measuring 2 mi x 1 mi x 7 ft to study heat exchange between the ocean and the atmosphere and how the intervening ice influences that exchange. The scientists also hope to learn more about the formation and dispersal of antarctic bottom water, a significant factor affecting global climate.

F-45636
Liubarskiĭ, A.N., Romanov, A.A., Chepurina, M.A., **Interrelationship between the ice and hydrometeorological processes in the southern ocean** [O vzaimosviazi ledovykh i gidrometeorologicheskikh protsessov v IUzhnom okeane], Vsesoiuznyĭ simpozium "Meteorologicheskie issledovaniia v Antarktike," 3rd, Leningrad, Oct. 22-24, 1986. Sbornik dokladov (All-Union Symposium "Meteorological investigations in the Antarctic", 3rd, Leningrad, Oct. 22-24, 1986. Proceedings). Vol.1, Leningrad, Gidrometeoizdat, 1990, p.26-29, In Russian. 4 refs.

The mechanism of interseasonal and interannual variations of sea ice formation in the southern ocean and its individual sectors is investigated. An analysis is made confirming the link between the ice regime variations and the thermal and circulation regimes of sea and air. The significance of the ice cover as one of the basic components of the antarctic climatic system is pointed out.

F-45646
Nazarov, V.D., **Penetration of solar radiation into the artificially compacted snow of runways** [Proniknovenie solnechnoĭ radiatsii v iskusstvenno uplotnennoe snezhnoe pokrytie VPP], Vsesoiuznyĭ simpozium "Meteorologicheskie issledovaniia v Antarktike," 3rd, Leningrad, Oct. 22-24, 1986. Sbornik dokladov (All-Union Symposium "Meteorological investigations in the Antarctic", 3rd, Leningrad, Oct. 22-24, 1986. Proceedings). Vol.1, Leningrad, Gidrometeoizdat, 1990, p.68-71, In Russian.

A comparative study of solar radiation penetration and weakening coefficient values of naturally compacted versus artificially compacted snow of the Molodezhnaya runway is discussed. It is found that, although the runway's surface layer permits greater radiation penetration than that of the naturally compacted snow, it slows down the radiation percolation to the underlying layers of the structure, protecting them from excessive solar heat and providing greater safety for aircraft operations.

F-45657
Sakunov, G.G., **Spectral albedo of the antarctic snow surface** [Spektral'noe al'bedo zasnezhennoĭ poverkhnosti Antarktidy], Vsesoiuznyĭ simpozium "Meteorologicheskie issledovaniia v Antarktike," 3rd, Leningrad, Oct. 22-24, 1986. Sbornik dokladov (All-Union Symposium "Meteorological investigations in the Antarctic", 3rd, Leningrad, Oct. 22-24, 1986. Proceedings). Vol.1, Leningrad, Gidrometeoizdat, 1990, p.110-115, In Russian. 6 refs.

Spectral measurements of surface albedo, conducted at Molodezhnaya, Vostok and Mirnyy Stations from Dec. 1984 to Mar. 1985, are discussed. Tabulated results, showing date, sun altitude, integral albedo, wavelength, cloudiness and snow surface characteristics, are presented. The highest values were recorded on Jan. 30 and Mar. 7 on a wavelength of 1100 nm. For another version of this paper see 17F-40179 or 43-4541.

F-45683
Lorius, C., **Environmental records from polar ice cores,** *Royal Society of London. Philosophical transactions. Series A,* Apr. 24, 1990 330(1615), p.459-462, 11 refs.

Polar ice cores provide a wide range of information on past atmospheric climate (temperature, precipitation) and environment (gas and aerosol concentrations). The dating can be very accurate for the more recent part of the records but accuracy decreases with depth and time. Measurements of cosmogenic isotope concentrations (such as Be-10) provide information on paleo-precipitation rates, and particular events can be used to correlate ice core records. Besides these climatic applications, Be-10 concentration records in ice cores also contain information on solar activity changes. (Auth.)

F-45684
Raisbeck, G.M., Yiou, F., Jouzel, J., Petit, J.R., **Be-10 and delta H-2 in polar ice cores as a probe of the solar variability's influence on climate,** *Royal Society of London. Philosophical transactions. Series A,* Apr. 24, 1990 330(1615), p.463-470, 11 refs.

By using the technique of accelerator mass spectrometry, it is now possible to measure detailed profiles of cosmic ray-produced Be-10 in polar ice cores. Recent work has demonstrated that these profiles contain information on solar activity, via its influence on the intensity of galactic cosmic rays arriving in the Earth's atmosphere. It has been known for some time that, as a result of temperature-dependent fractionation effects, the stable isotope profiles delta O-2 and delta H-2 in polar ice cores contain paleoclimate information. Thus by comparing the Be-10 and stable isotope profiles in the same ice core, one can test the influence of solar variability on climate, and this independent of possible uncertainties in the absolute chronology of the records. Two antarctic ice cores, one from the South Pole covering the past *ca.* 1000 years, and one from Dome C covering the past *ca.* 3000 years are compared. (Auth. mod.)

F-45685
Oeschger, H., Beer, J., **Past 5000 years history of solar modulation of cosmic radiation from Be-10 and C-14 studies,** *Royal Society of London. Philosophical transactions. Series A,* Apr. 24, 1990 330(1615), p.471-480, 12 refs.

Be-10 is produced in a similar way to C-14 by the interaction of cosmic radiation with the nuclei in the atmosphere. Assuming that the Be-10 and C-14 variation are proportional and considering the different behavior in the Earth system, the Be-10 concentrations in ice cores can be compared with the C-14 variations in tree rings. A high correlation is found for the short-term variations (C-14-Suess-wiggles). They reflect with a high probability production rate variations. More problematic is the interpretation of the long-term trends of C-14 and Be-10. Several explanations are discussed. The reconstructed CO2 concentrations in ice cores indicate a nearly constant value (280 p.p.m. by volume) during the past few millenia. Measurements on the ice core from Byrd Station, Antarctica during the period 9,000 to 6,000 years BP indicate a decrease that might be explained by the extraction of CO2 from the atmosphere-ocean system to build the terrestrial biomass pool during the climatic optimum. (Auth.)

F-45686
Splettstoesser, J., **Antarctic global warming,** *Nature,* Feb. 6, 1992 355(6360), p.503, 6 refs.

Comparing photo images in prior years to recent investigations of certain glacial features on Stonington I. and the Wordie Ice Shelf, the author finds a significant decrease in the areas covered by these features. It is suggested that these decreases may be part of a progressively warming period in this part of Antarctica.

F-45746

Paterson, W.S.B., **Why ice-age ice is sometimes "soft",** *Cold regions science and technology,* Nov. 1991 20(1), p.75-98, Refs. p.95-98.

Data on the mechanical properties, texture, fabric, and impurity content of ice deposited during the last glaciation are reviewed. The conclusions are: (1) chloride and possibly sulphate ions, in concentrations high relative to those in Holocene ice, impede grain-boundary migration and grain growth so that the crystals remain small. (2) Such ice, in shear parallel to the ice-sheet bed, develops a strong, near-vertical, single- maximum fabric. (3) This fabric favors further deformation and this, in turn, further strengthens the fabric and keeps the crystals small. This is why the strain rate in ice-age ice, in simple shear, is some 2.5 times that in Holocene ice at the same stress and temperature. (4) Ice-age ice under other stress systems, such as ice in roughly the upper 60% of the ice thickness, in bedrock hollows, at a stationary ice divide, in ice streams and in ice shelves, will not have enhanced flow. (5) An anisotropic flow relation must be used for detailed modelling of polar ice sheets. Sites for ice core samples include Vostok Station, Byrd Station and Law Dome in Antarctica. (Auth. mod.)

F-45747

Moore, J.C., Wolff, E.W., Clausen, H.B., Hammer, C.U., **Chemical basis for the electrical stratigraphy of ice,** *Journal of geophysical research,* Feb. 10, 1992 97(B2), p.1887-1896, 28 refs.

Antarctic and Greenland ice core samples were studied using two different stratigraphic electrical techniques. The electrical conductivity measurement (ECM) technique is a d-c method, while dielectric profiling (DEP) is an a-c method. It was found that ECM responds only to acid, even in large excess of neutral salt concentrations. DEP responds to both acid and salt content of the ice. Acids may be giving rise to conduction through an increase in the number of ionization defects, or through a network of liquid veins between ice grains. Salts on the other hand appear to give rise to Bjerrum defects, which are bound charges and cannot provide a d-c current, but do produce a dielectric a-c conductivity. The two methods can be used together to give a rapid prediction of both acid and salt content of cores. This may be of particular use in Wisconsin-age ice from Greenland, but can generally be used to define parts of cores worthy of detailed chemical study. (Auth.)

F-45759

Orombelli, G., **Glaciers and glacial morphology at Terra Nova Bay: an opportunity for significant studies on environmental and climatic global changes,** *Società Geologica Italiana, Rome. Memorie,* 1991 Vol.46, Meeting on Earth Science Investigations in Antarctica, Siena, Oct. 4-6, 1989. Proceedings, p.9-16, With Italian summary. 24 refs.

Glacio-geological studies in the Italian Antarctic Program started at Terra Nova Bay during the field season 1985/86. They concerned the reconstruction of the East Antarctic Ice Sheet in this area during the Cenozoic maximum extent and during the last glacial maximum, the Late Pleistocene advances and the deglaciation history, the coastal emergence and glacier fluctuations during the Holocene. The studies included mass balance measurements and topographic surveys of glaciers near the Italian station, geochemical analysis, geophysical investigations and analysis of satellite imagery. (Auth. mod.)

F-45760

Souchez, R.A., **Stable isotopes in antarctic ice: glaciological implications,** *Società Geologica Italiana, Rome. Memorie,* 1991 Vol.46, Meeting on Earth Science Investigations in Antarctica, Siena, Oct. 4-6, 1989. Proceedings, p.17-24, With Italian summary. 15 refs.

Glacier and ice shelf dynamics are dependent on basal conditions. These conditions can be appraised by a co-isotopic study, both in deltaD and deltaO-18, of basal ice. The ice, either of continental or marine origin, can be sampled in selected sites where, due to special dynamic situations, it is brought to the surface, or in deep ice cores. Not only can different types of basal ice be distinguished by their specific isotopic signature, but the origin of basal waters and the freezing rates for ice due to water freezing can be determined in favorable circumstances by the isotopic method. (Auth.)

F-45761

Chinn, T.J., **Polar glacier margin and debris features,** *Società Geologica Italiana, Rome. Memorie,* 1991 Vol.46, Meeting on Earth Science Investigations in Antarctica, Siena, Oct. 4-6, 1989. Proceedings, p.25-44, With Italian summary. Refs. p.43-44.

Polar or dry-based glaciers display a variety of margin forms, ranging from low-angled ramps through dome shapes to ice cliffs near 20 m in height. Common to all of these forms is a three-part structural sequence of white glacier ice, terminating at an inner moraine, which is surrounded by an outer apron structure. The forms and behavior of cold-glacier margins result from the effects of the internal ice regime zones and the fact that basal ice is frozen to the ground. Where the ice thins to about 20 m around the glacier edges, the upper semi-rigid zone becomes grounded. Basal debris is upwarped against this obstructing ice to appear at the surface as a shear moraine. Where the glacier carries a significant debris load, the insulating effect of this cover profoundly modifies the basic margin forms by eliminating ablation beyond the shear moraine. Two mechanisms for entraining large volumes of debris into polar glaciers are described.

F-45762

Baroni, C., Stenni, B., Iacumin, P., **Oxygen isotopic composition of ice samples from the Hells Gate and Backstairs Passage ice shelves (Victoria Land, Antarctica): evidence of bottom freezing,** *Società Geologica Italiana, Rome. Memorie,* 1991 Vol.46, Meeting on Earth Science Investigations in Antarctica, Siena, Oct. 4-6, 1989. Proceedings, p.45-48, With Italian summary. 12 refs.

Sixty-five samples from the Hells Gate and Backstairs Passage ice shelves have been studied for their oxygen isotopic composition. The deltaO-18 values obtained from seawater edge ice and ice beneath dirt cones range from -0.80 to +2.66 per mill, suggesting that the origin of this ice is essentially from seawater freezing. Ice samples from the upper section of dirt cones show deltaO-18 values from -12.68 to -6.15 per mill, which are intermediate between those of seawater ice and continental ice. These values are probably explained by the mixing of water from the melting of the snowdrift ice capping the cones, and the seawater ice forming their main body. The ice core of the moraine of Corner Glacier, further inland, shows deltaO-18 values from -31.81 to -26.40, in agreement with a continental origin of the ice. This ice is clearly formed by snow which fell at higher elevations, as proven by the notable O-18 depletion of these samples as compared to local snowfall. It is apparent that the origin of ice can be well identified by isotope measurements, irrespective of sample location and appearance. (Auth. mod.)

F-45763

Meneghel, M., Smiraglia, C., **Snow stratigraphy and accumulation at Browning Pass (Northern Victoria Land, Antarctica). Preliminary observations,** *Società Geologica Italiana, Rome. Memorie,* 1991 Vol.46, Meeting on Earth Science Investigations in Antarctica, Siena, Oct. 4-6, 1989. Proceedings, p.49-58, With Italian summary. 15 refs.

Preliminary results on snow parameters recorded during 1988-89 summer at Browning Pass, an ice passage linking the Campbell Glacier with the Priestley Glacier, are presented. A topographic survey was made between the Pass and the confluence with Boomerang Glacier. Three lines of stakes were laid out to measure snow accumulation or ablation and surface velocities. Shallow pits were dug and observations were made on stratigraphy, temperature and density of the firn layers. (Auth.)

F-45764

Meneghel, M., Smiraglia, C., **Preliminary data on the mass balance of the Strandline Glacier (Terra Nova Bay, Antarctica),** *Società Geologica Italiana, Rome. Memorie,* 1991 Vol.46, Meeting on Earth Science Investigations in Antarctica, Siena, Oct. 4-6, 1989. Proceedings, p.59-67, With Italian summary. 12 refs.

In 1988-89, investigations were carried out on the mass balance of the Strandline Glacier, a small alpine glacier on the coast of Gerlache Inlet, Terra Nova Bay. By using measurements along two stake alignments, from the end of summer 1988-89, the Strandline annual balance showed a slight deficit (average ice ablation of 353 mm of water equivalent along the cross profile in the lower sector of the glacier, and a mean accumulation of 97 mm of water equivalent at the highest measurement points). Over all the glacier a net specific mass balance of -20.4 mm was obtained. On the ice cliff margin during the summer of 1988-89 there was an ablation of 410 mm of water equivalent attributable to melting and calving. (Auth. mod.)

F-45765

Baroni, C., Frezzotti, M., Giraudi, C., Orombelli, G., **Ice flow and surficial variation inferred from satellite image and aerial photograph analysis of Larsen Ice Tongue, Hells Gate and Nansen ice shelves (Victoria Land, Antarctica),** *Società Geologica Italiana, Rome. Memorie,* 1991 Vol.46, Meeting on Earth Science Investigations in Antarctica, Siena, Oct. 4-6, 1989. Proceedings, p.69-80, With Italian summary. 23 refs.

The Nansen Ice Sheet covers an area of about 1,800 sq km. The mean ice surface velocity ranges from 120 to 360 m/yr. The highest velocities are found close to the ice barrier where the ice sheet spreads out. Between 1972 and 1988, the ice sheet increased by about 56 sq km at an average rate of 3.5 sq km/yr. The surface velocity of the Larsen Ice Shelf ranges from 115 to 170 m/yr. The ice tongue surface increased by about 19 sq km over the period 1957-1988. Hells Gate is a small ice shelf more than 70 sq km wide. A comparison of the aerial photographs taken in 1956-57 and 1985 shows that the mean ice surface velocity close to the calving margin varies from 3.3 m/yr in the eastern sector to 10.2 m/yr in the faster-moving western sector. The ice cliff retreated between 1956-57 and 1988 with an areal reduction of 1.15 sq km. In the same period, the ice lost to calving has been estimated between 2.5 and 3.5 million cu m/yr. A large amount of the ice broke away in winter 1987. (Auth. mod.)

F-45863

Huybrechts, P., **Antarctic ice sheet and environmental change: a three- dimensional modelling study,** *Berichte zur Polarforschung,* 1992 No.99, 241p., With German summary. Refs. p.223-241.

A qualitative description is given of the role of the antarctic ice sheet in the global environment system, and the possible modes of interaction are discussed. It is investigated using a high-resolution 3-D flow model covering the entire ice domain. This model incorporates a coupled ice shelf, grounding- line dynamics, basal sliding and isostatic bed adjustment. It has a full coupling between thermal field and ice flow, and the ice sheet geometry is freely generated in response to specified environmental conditions. The model is driven by changes in sea level, surface temperature and mass balance. A series of climatic experiments is performed, in which the model is used to examine the ice sheet during the last glacial-interglacial cycle. This involves a sensitivity study with respect to changing environmental conditions and a time-dependent simulation of the last glacial cycle. Fluctuations are essentially controlled by variations in eustatic sea level, whereas typical glacial- interglacial changes in temperature and ice deposition rates tend to balance one another. On the shorter greenhouse warming time scale, the model response is determined by changes in the mass balance. As long as the temperature rise is below 5 C, the antarctic ice sheet will probably grow, because melting at the ice sheet edge can still be offset by higher deposition rates on the plateau. The hypothesis of a catastrophic collapse of the West Antarctic ice sheet is not supported by the model results presented in this study. (Auth. mod.)

F-45912

Harrison, W.D., Echelmeyer, K.E., **Short-term variations in the flow of ice stream B, Antarctica,** *Antarctic Journal of the United States,* 1990 25(5), p.77-79, 5 refs.

High-resolution vertical strain rate measurements were carried out at 3 sites separated by distances of typically 3 km, at ice depths of about 60 m, on ice stream B in 1988-1990, with time resolution of 1 h. The strain resolution was usually 2 ppm and was measured with resistance wires about 1 m long. Data are shown in figures, with diurnal oscillation in the strain rate as the most striking feature.

F-45913

Alley, R.B., **Ice flow on deforming sediments: Ice stream B—and Lake Michigan?,** *Antarctic Journal of the United States,* 1990 25(5), p.79-80, 5 refs.

On the theory of the existence of a deforming bed beneath ice stream B, a possible one-dimensional steady model for basal behavior, consistent with available data favoring the deforming bed hypothesis, is discussed. The ice streaming dynamics suggested by the model are described; the possibility is contemplated that ice stream B and the Lake Michigan lobe may be quite similar in ice and sediment dynamics.

F-45914

Engelhardt, H., Humphrey, N., Kamb, B., **Borehole geophysical observations on ice stream B, Antarctica,** *Antarctic Journal of the United States,* 1990 25(5), p.80-82, 4 refs.

Geophysical experiments and observations made in 6 boreholes about 1,060 m deep, drilled on ice stream B in the 1989-1990 season, are discussed from the following points of interest: sampling of subglacial material, till thickness, ice deformation, till deformation, basal sliding, and basal water pressure and hydraulic conductivity.

F-45915

Jacobel, R.W., Hodge, S.M., Wright, D.L., **Studies of internal layering and bedrock topography on ice stream C, West Antarctica,** *Antarctic Journal of the United States,* 1990 25(5), p.82-85, 5 refs.

During the 1987-1989 field seasons, surface-based ice radar profiling studies were done on ice streams B and C. This article summarizes progress to date on the analysis of a portion of the data acquired near the Upstream C camp in 1988-1989. One of the figures presented shows a contour map and mesh diagram of ice thickness beneath the center portion of the strain grid. Because the surface elevations change by only a few meters in this area, it is also a good approximation of the bedrock topography. A strong correlation is found between the bedrock topography and surface features and velocities in the area, even though ice stream C is nearly stagnant. A second focus of the investigation concerns the internal layering; a figure typical of most of the data shows deformation of the internal layers of ice stream C which bears no simple relation to the bed or surface topography.

F-45916
Bentley, C.R., Anandakrishnan, S., Atre, S.R., Munson, C.G., **Analysis of seismic data from ice stream C,** *Antarctic Journal of the United States,* 1990 25(5), p.86-88, 6 refs.

A report is presented on analyses of seismic data collected around Upstream C camp during the 1988-1989 austral summer. Microearthquake activity near the camp, monitored on a 7 by 4 km array, was characterized by swarms of events separated by quiet periods. From the total activity, it is estimated that at least 5% of the ice stream motion is due to slip and faults. Secondary arrivals from the microearthquakes provided information about the Earth structure beneath ice stream C, and a travel-time plot formed from the P-wave seismograms for 15 events is illustrated. Data analysis suggests that ice stream C is underlain by a low velocity sedimentary layer whose thickness, based on an assumed velocity of 2 km/s, is approximately 400 m.

F-45917
Bentley, C.R., Retzlaff, R., Novick, A.N., Lord, N., **Analysis of radar data,** *Antarctic Journal of the United States,* 1990 25(5), p.88-90, 3 refs.

During the 1987-1988 summer, a fading pattern experiment was performed at Down B camp on the ice plain of ice stream B, consisting of repeated radar reflection profiles. The purpose of the experiment was to determine the differential movement rates between the surface and bed of the ice stream at a location on the ice plain. During the 1988-1989 summer, an airborne radar was flown over much of the upstream portions of ice streams B and C. A short pulse radar was deployed on 5 profiles across the buried shear margin of ice stream C to determine the depth of buried crevasses, which were detected everywhere along the tens of kilometers of lines profiled in the vicinity of Upstream C.

F-45918
Raymond, C.F., Weertman, B.R., **Glaciological observations on Dyer Plateau, Antarctic Peninsula,** *Antarctic Journal of the United States,* 1990 25(5), p.90-92, 2 refs.

To obtain paleoclimatic data from near latitude 70S in the Antarctic Peninsula, in 1989-1990 a field program was carried out on the crest of Dyer Plateau which included ice coring to 235 m depth, near surface sampling in pits, and various geophysical measurements summarized in this article. Geophysical measurements included geodetic surveying of an extensive marker network, satellite location of 3 markers, radio echo sounding traverses, marking of core holes for vertical strain measurement, and snow accumulation.

F-45919
Mayewski, P.A., **Detailed glaciochemical investigations in southern Victoria Land, Antarctica—a proxy climate record,** *Antarctic Journal of the United States,* 1990 25(5), p.93, 5 refs. For another version see 18B-41174.

During the 1987-1988 austral field season, several sites in southern Victoria Land were investigated as potential core sites. The site chosen for investigation during the 1988-1989 season was the Newall Glacier in the Asgard Range. The major goal of the 1988-1989 field program was the collection of two cores, 150 and 175 m deep, respectively.

F-45920
Schultz, L., Annexstad, J.O., Delisle, G., **Ice movement and mass balance at the Allan Hills Icefield,** *Antarctic Journal of the United States,* 1990 25(5), p.94-95, 9 refs.

In an attempt to provide a quantitative measure of ablation and ice flow, a triangulation network across the Allan Hills Icefield was established in 1978. The mean annual ablation rate of about 4.5 cm/y, measured in 1988, is found to be comparable to that measured in previous years. The horizontal ice movement of the individual stations is shown in a figure. At the most westerly stations, the ice moves about 60 cm/y in an almost northern direction. Most of the meteorites found are where ice velocities drop to less than 8 cm/y.

F-45921
Elliot, R.J., Faure, G., **Ice fabric in the Reckling Moraine,** *Antarctic Journal of the United States,* 1990 25(5), p.96-97, 5 refs.

The vertical alignment of crystals in the ice under the Reckling Moraine suggests that the ice has been rotated about 90 deg into a vertical orientation, just as predicted by a model of Whillans and Cassidy (1983). It is concluded that systematic studies of ice fabric may yield useful information about the structural deformation of ice sheets whose flow is disturbed by bedrock obstructions.

F-45922
Determann, J., Grosfeld, K., Ritter, B., **Melting rates at the bottom of Filchner-Ronne Ice Shelf, Antarctica, from short-term mass-balance studies,** *Polarforschung,* 1990(Publ. 1991) 60(1), p.25-32, With German summary. 15 refs.

Field studies which were performed in 1990 on a strain network yielded all quantities which are necessary to solve the mass-conservation equation with respect to the melting rate underneath the Filchner-Ronne Ice Shelf. The network was located about 30 km inland from the ice front and about 50 km northwest of Filchner Station. Repeated electrooptical distance measurements, direction observations and absolute positioning using satellite methods (GPS), determined strain rates and ice-flow velocities. Ice thickness and ice thickness gradients were obtained by hot-water drilling and electromagnetic reflection soundings (EMR), respectively. Surface accumulation rates were taken from measurements in snow pits. Due to the high precision of the field techniques, about one month between observations was sufficient to estimate a melting rate of 1.5 m/a within 0.15 m/a of accuracy. (Auth.)

F-45924
Rocchia, R., **Search for the Tunguska event relics in the antarctic snow and new estimation of the cosmic iridium accretion rate,** *Geological Society of America. Special paper,* 1990 Global catastrophes in earth history; an interdisciplinary conference on impacts, volcanism, and mass mortality. Edited by V.L. Sharpton and P.D. Ward., p.189-193, 14 refs.

A careful search for iridium in snow-ice samples deposited in Antarctica by the time of the great Tunguska explosion in 1908 has produced negative results. The worldwide dispersion of the cosmic bolide responsible for the event has not left a detectable Ir imprint in South Pole snow. The iridium infall from the Tunguska event is at least a factor of 20 lower than previously estimated. The local iridium background, averaged over a period of 30 years, is consistent with a global micrometeorite flux of about 10 Gg per year. (Auth.)

F-45978
Anandakrishnan, S., **Microearthquakes as indicators of ice stream basal conditions,** Madison, University of Wisconsin, 1990, 137p., University Microfilms order No.DA9106667, Ph.D. thesis. 66 refs.

During the 85-86 and the 88-89 antarctic field seasons, an earthquake detection array was deployed at Upstream B and Upstream C camps on ice streams B and C, respectively. A possible explanation is presented for the difference between ice streams B and C, West Antarctica. Ice stream B is moving at a velocity of 450 m/yr yet neighboring ice stream C is moving at less than 10 m/yr. It has been suggested that the high velocity of ice stream B is due to a thin dilatant bed beneath the ice stream that shears and deforms readily, thus allowing the rapid motion. It is hypothesized that this dilatant layer once existed beneath ice stream C; currently, however, it is of lower porosity and greater strength than the equivalent layer beneath ice stream B. Thus ice stream C cannot deform its bed and move rapidly. Rather, the driving stress of the ice produces shear fracture and faulting within the thin till layer beneath the ice. A seismograph array was built specifically to record the high-frequency microearthquakes at Upstream B and Upstream C camps. The microearthquakes recorded by this array were located and the source fault-plane was determined. The spectra of the arrivals were used to determine the source parameters. Analysis of microearthquake records indicates that 1-25% of the motion of ice stream C is due to slip on faults at the base of the ice stream. By contrast, only 1 part in 10,000,000 of the motion of ice stream B is due to slip on faults. (Auth.)

F-45981
Wadhams, P., **Variations in sea ice thickness in the polar regions,** International Conference on the Role of the Polar Regions in Global Change, Fairbanks, June 11-15, 1990. Proceedings, Vol.1, Fairbanks, University of Alaska, Dec. 1991, p.4-13, 37 refs.

An overview paper is presented on the evidence for variations in sea ice thickness in the polar regions. Most ice thickness data in the Arctic come from upward-looking sonar profiling by submarines. The available dataset is large. In the Antarctic ice thickness data are much sparser, and most have been obtained by direct drilling. Most of the available winter data come from only two cruises, the 1986 and 1989 Weddell Sea cruises of F.S. *Polarstern.* They show that first-year ice, which comprises most of the ice in the Antarctic, is remarkably thin, with a mean thickness of about 60 cm when undeformed. Second-year ice, found in the western Weddell Sea, is much thicker (1.17 m mean thickness when undeformed). Pressure ridging adds about 42% to the mean drafts due to undeformed ice alone, but most ridges are very shallow (less than 5 m deep). There is no evidence of temporal variations between the two cruises, although winter ice extent in the Atlantic sector was much greater in the second year. (Auth. mod.)

F-45982
Gloersen, P., Campbell, W.J., **Variations of extent, area, and open water of the polar sea ice covers: 1978-1987,** International Conference on the Role of the Polar Regions in Global Change, Fairbanks, June 11-15, 1990. Proceedings, Vol.1, Fairbanks, University of Alaska, Dec. 1991, p.28-34, 19 refs.

This paper presents an analysis of SMMR observations of the arctic, antarctic, and global sea ice area, extent, and open water within the ice pack. These data are corrected for instrumental drift and errors due to variations in the ecliptic angle. Also presented is an analysis based on a combination of Fourier and ordinary least-squares regression techniques which yields their interannual variations and trends. The Scanning Multichannel Microwave Radiometer (SMMR), which operated onboard the Nimbus-7 satellite from Oct. 1978 to Aug. 1987, obtained sequential synoptic observations of the entire arctic and antarctic sea ice covers every 2 days through the clouds during night and day. During the time of the study, the antarctic ice cover was trendless both in extent and area. However, the global trend is -1.0 + / - 0.7% at the 95% confidence level. In the Antarctic, the average seasonal range of open water area ranges from a minimum of 1.5 to a maximum of 4.5 million sq km. At the time of maximum ice extent, the amount of open water is typically 25%. The residuals and trends of the open water variations in the ice packs are discussed. (Auth. mod.)

F-45984
Jacka, T.H., Budd, W.F., **Detection of temperature and sea ice extent changes in the Antarctic and southern ocean,** International Conference on the Role of the Polar Regions in Global Change, Fairbanks, June 11-15, 1990. Proceedings, Vol.1, Fairbanks, University of Alaska, Dec. 1991, p.63-70, 31 refs.

From the increase of atmospheric greenhouse gas concentration to date and the results of transient climate models, an estimate of the expected change in antarctic temperatures and sea ice extent can be made. The existing data for observed changes in temperatures of the Antarctic and southern ocean (extending back to 1956 and 1945, respectively) are analyzed along with the data of sea ice cover (commencing in 1973) to examine the extent to which the anticipated warming trends and sea ice decrease are being realized. In spite of high temporal and spatial variability, the data do support small significant trends of temperature increase and sea ice cover decrease comparable in magnitude to those expected as a consequence of atmospheric greenhouse gas increase. The seasonal cycle shows a delayed period of autumn-winter sea ice growth with a longer period of open water. This supports a mechanism for positive feedback between decreasing sea ice cover and increasing temperatures. (Auth. mod.)

F-45989
Seko, K., Furukawa, T., Watanabe, O., **Surface condition on the antarctic ice sheet,** International Conference on the Role of the Polar Regions in Global Change, Fairbanks, June 11-15, 1990. Proceedings, Vol.1, Fairbanks, University of Alaska, Dec. 1991, p.238-242, 17 refs.

NOAA AVHRR radar reveals clear images of meso-scale undulating topography, surface properties and katabatic wind field on the antarctic ice sheet. Two typical patterns of undulations on the ice sheet are noted. One of them appears on the slope region where katabatic winds prevail. The band-shaped undulations develop with the prevailing wind, with a spacing of a few tens of km and an amplitude of a few tens of meters. A small percent of albedo change, associated with the variation of accumulation, co-exists with the undulation. The eolian process can be considered a dominant force in making this pattern. Another undulating pattern can be seen further inland on the plateau. This undulation has a different orientation, with an approximate spacing of 50 km and an amplitude of a few tens of meters. (Auth. mod.)

F-45994
Lange, M.A., **Antarctic sea ice: its development and basic properties,** International Conference on the Role of the Polar Regions in Global Change, Fairbanks, June 11-15, 1990. Proceedings, Vol.1, Fairbanks, University of Alaska, Dec. 1991, p.275-283, 20 refs.

Investigations on sea ice properties carried out during a number of expeditions into the Weddell Sea are reported. The results provide important baseline data, against which possible changes in the antarctic sea ice cover as induced by climatic changes can be compared. This paper concentrates on results dealing with the textural properties and the ice thickness distributions of antarctic sea ice. The contribution of meteoric ice (snow ice) to the sea ice cover is evaluated by means of deltaO-18 measurements. While changes in extent and thickness are to be expected as a result of possible climatic warming, it is proposed that the amount of snow ice will serve as an additional indicator of such changes. (Auth.)

F-45995

König-Langlo, G., Ivanov, B., Zachek, A., **Energy exchange over antarctic sea ice in late winter,** International Conference on the Role of the Polar Regions in Global Change, Fairbanks, June 11-15, 1990. Proceedings, Vol.1, Fairbanks, University of Alaska, Dec. 1991, p.325-329, 7 refs.

In Sep. and Oct. of 1989, during the "Winter Weddell Gyre Study", energy balance measurements were performed from the Soviet icebreaker *Akademik Fedorov.* The average radiation balance of the sea ice surface turned out to be zero, i.e., short-wave radiation gains were fully compensated by long-wave radiation losses. Due to turbulent fluxes of sensible and latent heat the atmosphere received about 25 W/sq m energy from the ice/ocean system. Since no significant ice melting or freezing was observed, the latter must originate mainly from warm deep water which is entrained into the oceanic mixed layer. (Auth.)

F-46004

Meese, D.A., Govoni, J.W., Lytle, V.I., Claffey, K., Ackley, S.F., **Sea-ice studies on the Winter Weddell Gyre Study, 1989,** *Antarctic journal of the United States,* MP 3061, 1990 25(5), p.116-117, 4 refs.

The U.S. Army Cold Regions Research and Engineering Laboratory participated in the Winter Weddell Gyre Study, 1989 on both the *Polarstern* and the *Akademik Fedorov.* On the *Polarstern,* remote sensing work was performed with two radars, and the authors assisted in the ice properties studies. On the *Akademik Fedorov,* they conducted studies on the physical, optical, chemical, and biological properties of the sea ice and carried out a detailed ice thickness study. For 12 days during the study, the *Akademik Fedorov* was moored to an ice floe to conduct extensive oceanographic and ice studies. Ice cores were collected to sample all of the various ice types available. Optical measurements were taken at 5 different locations in the area according to various ice type and thickness. In addition, five thickness profiles including a grid were taken through all anomalous locations, and one was taken in the usual manner to determine variations that may exist.

F-46005

Meese, D.A., Govoni, J.W., Ackley, S.F., **Snow and sea-ice thicknesses: Winter Weddell Gyre Study, 1989,** *Antarctic journal of the United States,* MP 3062, 1990 25(5), p.118, 6 refs.

During the Winter Weddell Gyre Study, 1989, 2,650 thickness holes were drilled at 29 different sites in the pack ice on the Weddell Sea from the Soviet icebreaker *Akademik Fedorov.* The primary objective of the study was to determine ice thickness, snow thickness, and freeboard variations within and among floes, and to examine the variations of these properties with geographic location in the Weddell Sea. Snow thicknesses ranged from 0 to 80 cm with a mean of 17.9 cm; ice thicknesses ranged from 0 to 279 cm with a mean of 64.9 cm; and freeboards ranged from -32 to 55 cm with a mean of 1.5 cm. Negative freeboards indicate that the top ice surface is below sea level; flooding of the ice was often observed at these locations. The values were visually examined in relation to latitude and longitude to determine if there was any consistent variation over the cruise track. A consistent trend was not evident.

F-46006

St. Germain, K., Swift, C.T., **Brightness temperature measurements, at 611 megahertz, of sea ice in the Weddell Sea,** *Antarctic journal of the United States,* 1990 25(5), p.119-120, 3 refs.

As part of the Winter Weddell Gyre Experiment 1989, the feasibility of measuring antarctic sea-ice thickness remotely was investigated by using passive microwave techniques. This required the installation of a 611 megahertz radiometer on board the West German research vessel *Polarstern.* A microwave radiometer measures the power level of incoming radiation. This power level is commonly expressed as a "brightness temperature". A figure shows the estimated percentage of error in the measurement as a function of sea-ice thickness, based on an assumed brightness temperature error of +/- 3 Kelvin. This curve demonstrates that it is theoretically possible to derive ice thickness for sea ice up to 1 m thick. The measurements should provide very useful surveys of antarctic ice thickness.

F-46007

Govoni, J.W., Meese, D.A., Perovich, D.K., **Optical measurements on sea ice from the Weddell Sea, Antarctica,** *Antarctic journal of the United States,* MP 3063, 1990 25(5), p.121-122, 6 refs.

During the 1989 Winter Weddell Gyre Study, combined optical and physical properties measurements were made of first-year sea ice in the Weddell Sea. Optical measurements consisted of incident, reflected, and transmitted spectral irradiances. An essential adjunct to the optical measurements was a complete characterization of the physical state and structure of the ice. This was accomplished by taking two ice cores from each site. When snow cover was present, its depth and stratigraphy were also recorded. Snow cover properties were characterized in terms of depth, density, grain size, and temperature for each layer. Photographs were also taken at each site and a general description of the ice, snow, and sky conditions was recorded.

F-46008

Lytle, V.I., Jezek, K.C., Gogineni, S.P., Moore, R.K., Ackley, S.F., **Radar backscatter measurements during the Winter Weddell Gyre Study,** *Antarctic journal of the United States,* MP 3064, 1990 25(5), p.123-125, 5 refs.

Data primarily taken over first and second year ice during the Weddell Sea cruise of F.S. *Polarstern* in Sep. and Oct. 1989 are discussed. Radar measurements were conducted in conjunction with detailed snow and ice measurements, including snow and ice thickness, surface roughness, salinities, and densities. One of the salient features found in the Weddell Sea second year ice, in contrast to arctic second year ice, was a deep snow cover which depressed the ice surface below sea level, causing brine to infiltrate into the snow and creating a highly saline layer at the snow/ice interface. An associated slush layer was observed where the snow had been flooded but had not refrozen. Because of either the high salinity layer or the presence of slush at the snow/ice interface observed in the Weddell Sea, the radar penetration depth is less, leading to a reduction in volume scattering relative to arctic sea ice.

F-46035

Bentley, C.R., Giovinetto, M.B., **Mass balance of Antarctica and sea level change,** International Conference on the Role of the Polar Regions in Global Change, Fairbanks, June 11-15, 1990. Proceedings, Vol.2, Fairbanks, University of Alaska, Dec. 1991, p.481-488, 46 refs.

The overall mass balance of the antarctic ice sheet has been estimated by comparison of the best available data on input in the form of snowfall with output in the form of ice flux through gates at or near the margin of the ice sheet. Surface melt is a negligible contributor to mass balance and has been ignored. Bottom melt under large ice shelves remains a major source of uncertainty. It is concluded that there is probably an excess input of 2-25% of the total input, equivalent to a sea level lowering of 0.1-1.1 mm/yr. Although errors remain, it becomes increasingly clear that an antarctic contribution to current sea level rise is unlikely. A reported iceberg flux that is larger than the mass input is attributed to a non-equilibrium breakback of the fronts of the ice shelves. (Auth.)

F-46036
Budd, W.F., Simmonds, I., **Impact of global warming on the antarctic mass balance and global sea level,** International Conference on the Role of the Polar Regions in Global Change, Fairbanks, June 11-15, 1990. Proceedings, Vol.2, Fairbanks, University of Alaska, Dec. 1991, p.489-494, 21 refs.

The present antarctic net accumulation and coastal ice flux each amount to about 2000 cu km/yr, both of which on their own would equate to approximately 6 mm/yr of sea level change. The present rate of sea level rise of about 1.2 mm/yr is therefore equivalent to about 20% imbalance in the antarctic mass fluxes. The magnitude of the changes to the antarctic precipitation and evaporation have been studied by a series of General Circulation Model experiments, using a model which gives a reasonable simulation of the present antarctic climate, including precipitation and evaporation. The experiments examine the changes in the antarctic precipitation (P) and evaporation (E) resulting separately from decreasing incrementally the antarctic sea ice concentration and from global warming accompanied by decreased sea ice cover. For total sea ice removal the changes obtained were P:+23%; E:-8%; (P-E):+48%. For global warming with sea ice reduction by about two thirds the changes were P:+47%; E:+22%; (P-E):+68%. This latter increase in mass flux is equivalent to about 4 mm/yr of sea level lowering which could provide a small but significant offset to the sea level rise expected from ocean thermal expansion and melting of temperate glaciers. (Auth. mod.)

F-46037
Olausson, E., **Post-Cromerian rise in sea level,** International Conference on the Role of the Polar Regions in Global Change, Fairbanks, June 11-15, 1990. Proceedings, Vol.2, Fairbanks, University of Alaska, Dec. 1991, p.496-498, 11 refs.

The intensified cooling in the Northern Hemisphere during the Elsterian-Saalian ice ages (isotopic stages 22-6) resulted in a reduction of the antarctic ice sheet by 10-15 million cu km, equal to a rise in sea level of about 40 m. This rise in sea level changed the hydrography of the Black Sea during the late Pleistocene warmer times, caused anoxic conditions in the eastern Mediterranean during the corresponding warming-up phases, and enhanced water transport of less saline water from the Pacific into the Arctic Ocean (the present sill depth of the Bering Strait is about 50 m). The increased supply of less saline water strengthened the halocline in the Arctic Ocean, increasing the sea ice there and, by higher albedo, its cooling effect on the adjacent continents. (Auth.)

F-46039
Lorius, C., **Polar ice cores: climatic and environmental records,** International Conference on the Role of the Polar Regions in Global Change, Fairbanks, June 11-15, 1990. Proceedings, Vol.2, Fairbanks, University of Alaska, Dec. 1991, p.570-575, 44 refs.

Ice cores from Greenland and Antarctica provide multiple proxy records of climatic and environmental parameters. The deltaO-18 or deltaD records from the Vostok ice core strongly suggest the role of insolation orbital forcing, as well as a close relation between temperature and greenhouse gas concentrations. CO2 and CH4 concentrations increase by about 40% and 100% during glacial-interglacial transitions, respectively. It appears likely that fluctuating greenhouse gas concentrations have had a significant role in the glacial-interglacial climate changes by amplifying, together with the growth and decay of the Northern Hemisphere ice sheets, the orbital forcing. Climate sensitivity to greenhouse forcing estimated from paleo-ice core data is consistent with GCM simulations giving a 3-4 C warming for a future doubled atmospheric CO2. (Auth. mod.)

F-46041
Mosley-Thompson, E., Thompson, L.G., **Spatial and temporal characteristics of the Little Ice Age: the antarctic ice core record,** International Conference on the Role of the Polar Regions in Global Change, Fairbanks, June 11-15, 1990. Proceedings, Vol.2, Fairbanks, University of Alaska, Dec. 1991, p.606-610, 18 refs.

This paper examines the temporal and spatial characteristics of the dust and deltaO-18 information from antarctic ice cores. Substantial differences exist in the records. For example, a 550-year record of deltaO-18 and dust concentrations from Siple Station suggests that warmer, less dusty conditions prevailed from A.D. 1600 to 1830. Alternately, dust and deltaO-18 from Amundsen-Scott Station indicate that opposite conditions (e.g., cooler and more dusty) were prevalent during the Little Ice Age (LIA). Three additional records provide further support for the LIA temperature opposition between the Antarctic Peninsula region and East Antarctica. In addition, periods of strongest LIA cooling are not temporally synchronous over East Antarctica. These strong regional differences demonstrate that a suite of spatially distributed, high resolution ice core records will be necessary to characterize the LIA in Antarctica. (Auth. mod.)

F-46042
Vaikmïae, R.A., **Paleoenvironmental data from less-investigated polar regions,** International Conference on the Role of the Polar Regions in Global Change, Fairbanks, June 11-15, 1990. Proceedings, Vol.2, Fairbanks, University of Alaska, Dec. 1991, p.611-616, 14 refs.

This paper discusses the oxygen-18 variations in intermediate-depth ice cores from smaller ice caps of Svalbard and from the marginal area of the antarctic ice sheet, covering the time span from 1000 to 8000 years B.P. All profiles studied clearly reflect the main climatic events during this time interval. However, small shifts in time exist between details on different curves. Most probably this is due to certain asynchronity in climatic changes in the various regions. For paleoclimatic and paleopermafrost reconstructions, the isotopic content of polygonal wedge ice seems to be most promising. The attempts to use isotopic records from segregated ice for paleoenvironmental research is also discussed. (Auth. mod.)

F-46049
Craig, H., Wharton, R.A., Jr., McKay, C.P., **Oxygen supersaturation in ice-covered antarctic lakes: biological versus physical contributions,** *Science,* Jan. 17, 1992 255(5042), p.318-321, 8 refs.

Freezing in ice-covered lakes causes dissolved gases to become supersaturated while at the same time removing gases trapped in the ablating ice cover. Analysis of N2, O2, and Ar in bubbles from Lake Hoare ice shows that, while O2 is 2.4 times supersaturated in the water below the ice, only 11% of the O2 input to this lake is due to biological activity: 89% of the O2 is derived from meltwater inflow. Trapped bubbles in a subliming ice cover provide a natural "fluxmeter" for gas exchange: in Lake Hoare as much as 70% of the total gas loss may occur by advection through the ice cover, including 75% of the N2, 59% of the O2, and 57% of the Ar losses. The remaining gas fractions are removed by respiration at the lower boundary (O2) and by molecular exchange with the atmosphere in the peripheral summer moat around the ice. (Auth.)

F-46062

Orombelli, G., Baroni, C., Denton, G.H., **Late Cenozoic glacial history of the Terra Nova Bay region, northern Victoria Land, Antarctica,** *Comitato glaciologico italiano. Bollettino. Ser. 3. Geografia fisica e dinamica quaternaria,* 1990 13(2), p.139-163, With Italian summary. 33 refs.

Glacial geological and geomorphological research in the Terra Nova Bay region was undertaken to decipher late Cenozoic ice-sheet behavior in northern Victoria Land. The work is part of a continuing program to understand and anticipate the response of the antarctic ice sheet to climatic change. The Transantarctic Mountains inland of Terra Nova Bay exhibit four major landscapes: 1) deep troughs propagated inland by headward cutting; 2) well-developed alpine glacial topography (with cirques, ridges, horns, and spurs); 3) relict summit mesas; and 4) undulating coastal piedmonts that are tilted seaward. Trimlines superimposed on the alpine and outlet-trough topography mark the maximum possible expansion of the northern Victoria Land ice cover since erosion of the alpine topography. This expansion was minor in the upper reaches of outlet glaciers and in mountain accumulation areas while it represented great thickening in the coastal area. There is no definitive evidence that the East Antarctic ice sheet overrode northern Victoria Land nunataks or mountains. Several glacial drifts have been differentiated. Terra Nova Bay drift (late Wisconsin) is well-exposed and preserved along coastal ice-free areas, where it was cut beginning 7,000-8,000 yr B.P. by beaches now up to 30 m above present sea level. The Terra Nova drift limit can be traced far inland along the main glaciers. During late Wisconsin time, the glacier thickening was greatest in coastal regions, where a grounded piedmont glacier filled Terra Nova Bay. The Terra Nova piedmont glacier was probably part of a marine-based ice sheet in the inner Ross Embayment. High-elevation striations in the Eisenhower Range seem to have been carved during Terra Nova glaciation. If so, local mesa ice caps and mountain glaciers expanded to feed the Terra Nova piedmont glacier during late Wisconsin time, unlike the situation farther south where alpine glacier termini in the Dry Valleys were less extensive than now during late Wisconsin time. (Auth. mod.)

F-46063

Meneghel, M., **Preliminary measurements of the northern glacier of Tarn Flat (Victoria Land, Antarctica)** [Misure preliminari sul ghiacciaio settentrionale di Tarn Flat (Terra Vittoria, Antartide)], *Comitato glaciologico italiano. Bollettino. Ser. 3. Geografia fisica e dinamica quaternaria,* 1990 13(2), p.183-185, In Italian with English summary. 8 refs.

The work reports the survey made on a small glacier mainly fed by wind blown snow in the deglaciated area of Tarn Flat, during the 5th Italian expedition of the Programma Nazionale di Richerche in Antartide. A net of 15 stakes has been placed on the glacier to measure deformations, velocity, and accumulation and ablation rates. To check the position of the snout 5 points have been arranged. This glacier, because of its small size, could give clear evidence of even weak environmental changes. (Auth.)

F-46104

Kim, D.H., Kwok, K.C.S., Rohde, H.F., **Similitude requirements of snowdrift modelling for antarctic environment,** *University of Sydney, Australia. School of Civil and Mining Engineering. Research report,* Feb. 1991 R-634, 69p., PB92-104157, Refs. p.28-32.

A closed-circuit turbulent boundary layer Snowdrift Wind Tunnel was built at the University of Sydney for the study of antarctic snow drifting. Scaled turbulent boundary layer winds, representing prototype summer and winter conditions (coastal sites of the Australian Antarctic Territory), were generated. Sodium bicarbonate was chosen as model snow. The results of snowdrift simulation using the model snow were compared with field measurements. Similitude parameters included flow and geometry, angle of repose, particle trajectory and time scale. The similitude requirement of scaled turbulent boundary layer wind is considered one of the most important modeling requirements. (Auth. mod.)

F-46105

King, E.C., Jarvis, E.P., **Effectiveness of different shooting techniques in antarctic firn,** *First break,* June 1991 9(6), p.281-288, 10 refs.

In Jan. and Feb. 1989 the British Antarctic Survey conducted experiments on seismic reflection shooting in the firn of the Larsen Ice Shelf. Twin Otter light aircraft were used to deploy field parties. Pentaerythritol-tetranitrate (PETN) and ammonium nitrate and fuel oil (ANFO) were used as explosives. The results and storage capabilities under cold conditions were the same for PETN and ANFO, but ANFO is cheaper. The results of the experiments are compared with results found in the literature from the Ronne Ice Shelf, the Ross Ice Shelf, and East Antarctica.

F-46106

Funaki, M., Sakai, H., **Acquisition of natural remanent magnetization for dirt-snow containing rock dust,** *Journal of geomagnetism and geoelectricity,* 1991 43(10), p.803-811, 16 refs.

Magnetization process of dirt-snow containing fine-grained magnetic minerals was investigated in order to understand the acquisition mechanism of natural remanent magnetization (NRM) by dirt-ice layers in Antarctica. Two types of NRM acquisition mechanisms in the geomagnetic field (GMF) are proposed: (1) magnetic grains align along the GMF when they drop onto the surfaces of underlying snow due to vaporization of snow; (2) the magnetic grains are rotated to align in the GMF direction on the snow surfaces by the torque with the GMF and the NRM. The compaction of the natural snow at formation of depth hoar works to flatten the NRM direction. Probably the antarctic dirt-ice has acquired NRM during the periods of accumulation of snow and magnetic grains and formation of the depth hoar. The NRM of dirt-snow and -ice are useful for understanding the glacial dynamics and paleomagnetism of the antarctic ice sheet. (Auth. mod.)

F-46107

Krovotyntsev, V.A., Milekhin, O.E., Popov, V.I., Spiridonov, IU.G., **Space radar observation of the dynamics of the ice coast and the drift of icebergs in the Antarctic,** *Soviet journal of remote sensing,* Feb. 1992 9(4), p.672-687, Translated from Issledovanie Zemli iz kosmosa, 1991. 16 refs.

Radar observations from oceanographic satellites are used to observe the dynamics of the ice coast of Antarctica and the breaking away of gigantic icebergs. The paper describes a digital radar map of Antarctica at 3 cm wavelength, generated in 1986. The trajectory of the drift of a gigantic iceberg in the Ross Sea is reconstructed for the period from 1988 to 1989. The paper considers the dynamics of the breaking away of three gigantic icebergs in the Weddell Sea in 1984-1990. The sizes of icebergs and the characteristics of their drift in summer and winter conditions are determined. (Auth.)

F-46109

Arapov, P.P., Krigel', A.M., **Daily variations in the snow surface roughness parameter in Severnaya Zemlya and in Antarctica** [Sutochnyĭ khod parametra sherokhovatosti snezhnoĭ poverkhnosti na Severnoĭ Zemle i v Antarktide], *Akademiia nauk SSSR. Institut geografii. Materialy gliatsiologicheskikh issledovaniĭ,* Oct. 1990 Vol.70, p.101-104, In Russian with English summary. 11 refs.

The data processing of gradient measurements made in the near-glacier layer of the atmosphere on Severnaya Zemlya and Antarctica has shown that considerable changes in snow surface roughness occur throughout a 24 hour period. It is concluded that daily changes of the snow roughness parameter in the polar regions are connected with the alternation of evaporation and sublimation with recrystallization. These processes influence the variations in the aerodynamic resistance coefficient of the elements of snow surface microrelief, causing the fluctuations in this parameter. (Auth. mod.)

F-46137
Mathews, W.H., **Ice sheets and ice streams: thoughts on the Cordilleran Ice Sheet Symposium,** *Géographie physique et Quaternaire,* 1991 45(3), Cordilleran Ice Sheet Symposium, Vancouver, British Columbia, May 1990. Edited by L.E. Jackson, Jr. et al, p.263-267, With French summary. 11 refs.

This paper comments on preconceptions about what is meant by the terms "Cordilleran Ice Sheet" and "ice stream". Contemporary antarctic ice streams are described. The Laurentian Channel and troughs crossing the continental ice shelf between Vancouver and Queen Charlotte Is. are suggested as candidates for the tracks of past ice streams. (Auth.)

F-46148
Udisti, R., Barbolani, E., Piccardi, G., **Determination of some organic and inorganic substances present at PPB level in antarctic snow and ice by ion chromatography,** Antarctica Project. Environmental impact: chemical methodologies, [Rome, Italian Research Council, 1991], p.325-341, Reprinted from Annali di chimica, 1991, Vol.81(7-8 and 9-10). 35 refs.

An ion chromatographic method for the determination of some components at trace levels in snow and ice samples collected during the Italian Antarctic Expedition 1987-88 is developed. The separation of fluorides, acetates, propionates, formiates and methansulphonates and their determination at concentrations lower than 1 microgram/l is achieved using Na2B4O7 as eluent in the gradient mode. Cluster analysis carried out for the components whose diffusion is mainly atmospheric shows good correlations within different classes of compounds. The contribution of methansulphonic acid, which is an index of marine biological activity, to the natural cycle of the sulphur compounds has been evaluated together with the percentage of the organic contribution to the total anionic charge in the snow precipitation. (Auth.)

F-46173
Faure, G., Buchanan, D., **Ablation rates of the ice fields in the vicinity of the Allan Hills, Victoria Land, Antarctica,** *American Geophysical Union. Antarctic research series,* 1991 Vol.53, Contributions to antarctic research II, p.19-31, 9 refs.

The ablation rates on the ice fields west of the Allan Hills were determined by measuring the lowering of the ice surface, recorded by 265 wooden dowels implanted in the ice, at the end of the summer and again 2 years later. The results were used to estimate both annual and summer ablation rates at the Elephant Moraine, the Reckling Moraine, and the Main ice field of the Allan Hills. The average annual ablation rates increase toward the edge of the ice sheet from 4.1 +/- 0.1 cm/yr at Elephant Moraine to 4.7 +/- 0.2 cm/yr at Reckling Moraine and to 5.3 +/- 0.1 cm/yr at the Allan Hills. Almost all of the ablation for the year occurs in about 70 days in summer. The average annual and summer ablation rates within the moraines are significantly lower than those of the open ice fields. The difference can be attributed to the presence of snow and rock clasts on the surface of the ice. (Auth. mod.)

F-46256
Parkinson, C.L., **Interannual variability of monthly southern ocean ice distribution,** *Journal of geophysical research,* Apr. 15, 1992 97(C4), p.5349-5363, 27 refs.

The region of the southern ocean exhibiting interannual variability in monthly averaged sea ice distributions has been mapped and analyzed, using data from the Nimbus 5 Electrically Scanning Microwave Radiometer (ESMR) and the Nimbus 7 Scanning Multichannel Microwave Radiometer (SMMR). Over the 13-year record from the two instruments, interannual variability is particularly high for the early summer month of Dec. This area of Dec. variability is almost three times the ocean area consistently having ice-covered conditions in the 13 ESMR/SMMR Decembers. In contrast, in mid-winter the area of consistent ice coverage far exceeds the area of variability, which, in spite of the much greater ice coverage overall, is not as large as the area of variability in Dec. The mid-winter variability is confined to (1) a ring of variable width around the edge of the ice pack and (2) the location of the 1974-1976 Weddell polynya. The images and plots provide a succinct summary of the range of spatial distributions of southern ocean sea ice during the ESMR and SMMR time periods. They can hence be used as a convenient base for comparisons with future sea ice distributions in the effort to identify occurrences of climate change. (Auth. mod.)

F-46283
Glazovskiĭ, A.F., Zakharov, V.G., **Morphology of ice-catchments in Antarctica** [Morfologiia ledosbornykh basseĭnov Antarktidy], *Akademiia nauk SSSR. Institut geografii. Materialy gliatsiologicheskikh issledovaniĭ,* May 1989 Vol.66, p.165-168, In Russian with English summary. 2 refs.

Data were used to arrange the ice basins of Antarctica according to their marine/terrestrial portion ratios, and to compare the results of this ranging with the ice discharge rate. Three types of glacier basins were distinguished: marine, transitional, and terrestrial. They were recognized by means of ice volume ratio. This ratio was estimated as the ice volume on the bedrock above sea level divided by the ice volume on the bedrock below sea level in each basin. The volume ratio for marine type basins varied from 0.7:10 to 2:10, for transitional type—from 8:10 to 27:10, and for terrestrial type—from 146:10 to 249:10. Specific ice discharge through a unit width of catchment margin was highest in marine basins. This is 2-3 times higher than in transitional basins, and 10-25 times higher than in terrestrial basins. (Auth. mod.)

F-46284
Kotliakov, V.M., Solomina, O.N., **Soviet glaciological studies in 1988** [Sovetskie gliatsiologicheskie issledovaniia v 1988 godu], *Akademiia nauk SSSR. Institut geografii. Materialy gliatsiologicheskikh issledovaniĭ,* May 1989 Vol.66, p.211-221, In Russian.

This article is a listing, with brief descriptions, of 1988 Soviet glaciological research projects that took place in the Caucasus, Central Asia, Khibin Mountains, Siberia, the Far East, Kamchatka, the Arctic, and Antarctica. The general subjects included mathematical modeling in glaciology, ice physics, snow and ice composition, glaciers, snow cover and avalanches, engineering geology, glacial geology and paleogeology, glacier flow, ground ice, river and lake ice, and naleds. For the Arctic, the projects included glaciation and ice cores. The projects for Antarctica were: glacier oscillation, glaciometeorological observations, glacioclimatic zoning, drilling of the ice sheet at Vostok Station, zoning of antarctic glaciers, ice core analysis at Dome B, and paleoclimatic reconstruction.

F-46285

Glazovskiĭ, A.F., **Soviet-French Workshop on the Results of Cores from Antarctic Boreholes, May-June 1989** [Sovetsko-frantsuzskiĭ seminar po itogam issledovaniĭ ledianogo kerna iz antarkticheskikh skvazhin, 30 maia-9 iiunia 1989 g.], *Akademiia nauk SSSR. Institut geografii. Materialy gliatsiologicheskikh issledovaniĭ,* May 1989 Vol.66, p.234, In Russian.

The central focus of this workshop was the analysis of ice core data from Vostok Station in terms of long-term global changes in the paleoclimate and environment. This brief report lists the participants in the workshop and presents the highlights of their findings. It concludes with future plans to drill ice cores in Adélie Coast, Dome C, and Greenland.

F-46344

Denton, G.H., Prentice, M.L., Burckle, L.H., **Cainozoic history of the antarctic ice sheet,** Geology of Antarctica. Edited by R.J. Tingey, Oxford, Clarendon Press, 1991, p.365-433, Refs. p.419-433.

The introductory and concluding pages of this chapter analyze the importance of antarctic ice sheet history, and its new directions, through three examples illustrating its key role: the ice age mystery, the origin of Man, and the effect of increased atmospheric CO2. The supporting discussion includes a description of the present antarctic cryosphere, the ice sheet fluctuations from Late Quaternary through Late Neogene and Tertiary, the threat to the antarctic ice sheet stability from CO2-induced warming of the lower atmosphere, and how this could affect the future behavior of the ice sheet. A working hypothesis for how antarctic ice sheet history relates to the deep-sea delta O-18 record and hominid evolution in Africa is illustrated, and five possible tests of the hypothesis are offered.

F-46370

Gordon, J.E., Timmis, R.J., **Glacier fluctuations on South Georgia during the 1970s and early 1980s,** *Antarctic science,* June 1992 4(2), p.215-226, 34 refs.

South Georgia is a highly glacierized island with a range of glacier types including corrie, valley and tidewater ice bodies. Glaciologically, it occupies a strategic location between South America and the Antarctic Peninsula and is potentially an important locality for establishing glacier-climate relationships in the region. Baseline surveys of ice front positions and ice surface profiles have been repeated to determine recent changes in several glacier types. Corrie and small, land-based valley glaciers have continued to thin and recede during the period of study, following an advance during the 1930s. Their behavior primarily reflects the effects of seasonal temperature variations in controlling net balances, and particularly the climatic warming since 1950. The larger valley and tidewater glaciers display a lagged response and in the 1970s were at their most advanced positions since the Little Ice Age of the 17-19th centuries. However, in the last few years they too have commenced to thin and recede. (Auth.)

F-46376

Eicken, H., **Role of sea ice in structuring antarctic ecosystems,** *Polar biology,* Apr. 1992 12(1), EPOS European Polarstern Study, Proceedings. No.1, p.3-13, Refs. p.11-13.

Sea-ice growth may divide an oceanic ecosystem into two dissimilar compartments: the water column, with primary production controlled by the reduction of irradiative fluxes due to the snow-laden sea-ice cover and thermohaline convection, and the pore space within the ice with incorporated organisms switching from a planktonic to a "kryohaline" mode of life. In the ice, physical boundary conditions are set by the irradiance, which is controlled by the optical properties of snow and ice, and the ambient temperature which controls salinity and brine volume. Partly due to the high levels of biomass within the sea-ice system, interaction between different groups of organisms concentrates on the planar environment predefined by the ice cover. As a result of regional structuring of ecosystems, four sea-ice regimes may be recognized: seasonal pack ice, coastal zone, perennial pack ice, and marginal ice zone. These regimes are interwoven through the temporal structuring of ecosystems brought about by ice-cover seasonality and ice drift. In comparison with open-water pelagic ecosystems, sea ice appears of particular importance as it partly inverts the ecosystem structure and enhances the degree of ecological variability. (Auth. mod.)

F-46392

Qin, D.H., Ren, J.W., **Study on snow profiles and surface characteristics along 6000 km trans-antarctic route (I),** *Science in China—Ser.B,* Mar. 1992 35(3), p.366-374, 14 refs.

Along a 5,986 km route on the antarctic ice sheet from west to east, 106 snow pits with a depth ranging from 1.0-2.0 m were dug during the 1990 International Trans-Antarctic Expedition. The basic physical characteristics of the surface layer of the ice sheet on a large scale were obtained through analysis of snow profiles at these snow pits, which shows that in West Antarctica the meltwater infiltration-congelation is obvious and the annual precipitation is larger than that in East Antarctica. This implies that the climate in West Antarctica is warmer, more humid and more directly influenced by the southern ocean than that in East Antarctica. Radiation ice-glazes frequently found in snow profiles indicate that even in East Antarctica under very low temperatures, surface melting occurs in summer due to the long-time solar radiation. Depth hoar is very much developed in the snow pits of East Antarctica. (Auth. mod.)

F-46393

Kikuchi, K., Harada, M., Uyeda, H., **Structure of polycrystalline initial ice crystals,** Physics and chemistry of ice. Edited by N. Maeno and T. Hondoh, Sapporo, Japan, Hokkaido University Press, 1992, p.328-335, 8 refs.

From among a number of microphotographs of ice and snow crystals photographed in ice prism and ice fog phenomena observed in the arctic and antarctic regions, the polycrystalline initial ice crystals (poly-snow germs) were selected and were classified into twelve types. Almost all of them were crossed plates types and their formation rate was approximately 5%. To investigate the shapes of artificial poly-snow germs and their production rate, laboratory experiments using a cloud chamber were carried out under temperature conditions between -14 and -42 C. As a result, almost all shapes which were observed in nature were produced in the chamber and the production rate was less than 5%. This value was similar to that of observational results. As one of the mechanisms for growth of these poly-snow germs, a cubic structure model might be possible. (Auth. mod.)

F-46394

Lange, M.A., Hubberten, H.W., **Isotopic composition of sea ice as a tool for understanding sea ice processes in the polar regions,** Physics and chemistry of ice. Edited by N. Maeno and T. Hondoh, Sapporo, Japan, Hokkaido University Press, 1992, p.399-405, 10 refs.

New data are reported on sea ice and its snow cover from the Weddell Sea. The samples were obtained during the Winter Weddell Gyre Study 1989 (WWGS '89) on RV *Polarstern.* The main emphasis of the present study is in unraveling the complex history and development of sea ice and snow through textural analysis and measurements of salinity and O-18. The concentration of O-18 provides information on the incorporation of meteoric ice into sea ice and on post-freezing/deposition processes in snow and ice. In conjunction with other data (e.g. ice thickness distribution) obtained at the same ice floes, one can determine its developmental history, otherwise hidden. Measurement of O-18 as an important tool in sea ice dynamics study is recommended. (Auth. mod.)

F-46400
Qin, D., Zeller, E.J., Dreschhoff, G.A.M., **Distribution of nitrate content in the surface snow of the antarctic ice sheet along the route of the 1990 International Trans-Antarctic Expedition,** *Journal of geophysical research,* May 1, 1992 97(A5), p.6277-6284, Refs. p.6283-6284.

Information about the geographic distribution of the nitrate fall-out over Antarctica was limited to only a few sites. A unique opportunity to examine this aspect of the nitrate distribution and to test more fully the hypothesis that atmospheric ionization from solar-charged particles is responsible for a significant portion of nitrate, was presented by a set of surface snow samples collected by the International Trans-Antarctica Expedition foot traverse. The set of 95 samples of the upper 25 cm was collected at roughly equal distances along the 5736 km route from July 27, 1989, to Mar. 3, 1990. Samples are distributed along a track from 65S, 59.6W, through 90S, to 66.5S, 95.6E, which represents geomagnetic latitudes 50S, west longitude, to 77S, east longitude. The profiles of nitrate concentration and flux along the route were plotted and indicate that (especially at the higher elevation of the polar plateau) the distribution may be affected by electron precipitation. (Auth. mod.)

F-46427
Verbitskiĭ, M.IA., **Equilibrium ice sheet scaling in climate modeling,** *Climate dynamics,* Mar. 1992 7(2), p.105-110, 23 refs.

A set of simple scaling formulas related to ice sheet evolution is derived from the dynamic and thermodynamic equations for ice and is used to consider two common situations: (a) the estimation of potential ice sheet characteristics given the prescribed net snow accumulation over an area; and (b) the reconstruction of net snow accumulation and vertical temperature difference within the ice sheet, given empirical data only concerning ice sheet area and volume. The scaling formulas are applied to the present day antarctic and Greenland ice sheets, as well as to some ancient ice sheets, and are used to estimate the potential global sea level change due to greenhouse warming. (Auth. mod.)

F-46429
Maupetit, F., Delmas, R.J., **Chemical composition of falling snow at Dumont d'Urville, Antarctica,** *Journal of atmospheric chemistry,* Apr. 1992 14(1-4), p.31-42, 26 refs.

Fourteen samples of fresh falling snow were collected at antarctic coastal base Dumont d'Urville in 1984. The samples have been analyzed for major ions by ion chromatography and acid titration. The results are relevant to the chemical composition of background precipitation in polar marine conditions. The seasalt aerosol contribution is dominant. The calculated non-seasalt sulfate concentration is significantly negative for 3 of the 14 samples. Non-seasalt sulfate is found to be relatively high in summer and fall. Methane sulfonic acid also exhibits the same pattern, probably linked to local marine biogenic activity and/or atmospheric photochemical processes. The methane sulfonic acid to non-seasalt sulfate ratio is in good agreement with values reported for coastal antarctic ice cores and subantarctic aerosol. The background mean value for nitrate concentration is 1.1 microgram energy equivalent/l but two very strong spikes are observed. The first seems to be linked with long range transport of continental air masses while the second (in winter) is clearly due to a sudden input of nitric acid, possibly from the stratosphere. This paper represents a preliminary approach to a larger air and snow monitoring to be developed at this site. (Auth. mod.)

F-46432
Görlach, U., Boutron, C.F., **Variations in heavy metals concentrations in antarctic snows from 1940 to 1980,** *Journal of atmospheric chemistry,* Apr. 1992 14(1-4), p.205-222, 29 refs.

Concentrations of Pb, Cd, Cu and Zn have been measured using improved ultraclean procedures in a succession of 26 snow samples integrating a 40 yr time sequence from 1940 to 1980. Samples were collected from the walls of a 6 m deep pit at stake D 55 in Adélie Land, East Antarctica. Measured concentrations, which are among the lowest ones ever measured in antarctic snows, are found not to have significantly increased during the investigated time period, with the possible exception of Pb, for which there might have been a significant increase after the mid 1960's. For this last metal, measured concentrations in the 1940's are about 6-fold higher than in antarctic Holocene ice several thousand years old, which indicates that a large fraction of the anthropogenic increase for Pb probably occurred before the 1940's. (Auth. mod.)

F-46434
Legrand, M., Feniet-Saigne, C., Saltzman, E.S., Germain, C., **Spatial and temporal variations of methanesulfonic acid and non-sea salt sulfate in antarctic ice,** *Journal of atmospheric chemistry,* Apr. 1992 14(1-4), p.245-260, 25 refs.

A simultaneous glaciochemical study of methanesulfonic acid (MSA) and non-seasalt sulfate has been conducted on the antarctic plateau (South Pole, Vostok) and in more coastal regions. The objective was to investigate marine sulfur emissions in very remote areas. Firstly, these data suggest that MSA and non-seasalt sulfate present in antarctic ice are mainly marine in origin and that dimethylsulfide (DMS) emissions have been significantly modulated by short term (e.g. El Nino Southern Oscillation events) as well as long term climatic changes in the past. Secondly, study of spatial variations of these two sulfur species seems to indicate that the atmosphere of coastal antarctic regions are mainly supplied by local DMS emissions whereas the atmosphere of the high plateau is also influenced by DMS emissions from more temperate marine latitudes. Thirdly, study of the partitioning between MSA and non-seasalt sulfate suggests that the temperature could have been an important parameter controlling the final composition of the high southern latitude atmosphere over the last climatic cycle; colder temperature favoring the formation of MSA. However, these data also support a possible role played by changes in the transport pattern of marine air to the high antarctic plateau. (Auth. mod.)

F-46437
Wharton, R.A., Jr., **Changes in ice cover thickness and lake level of Lake Hoare, Antarctica: implications for local climatic change,** *Journal of geophysical research,* Mar. 15, 1992 97(C3), p.3503-3513, 27 refs.

This paper reports results from 10 years of ice thickness measurements at perennially ice-covered Lake Hoare in southern Victoria Land. The ice cover of this lake had been thinning steadily at a rate exceeding 20 cm/yr during the last decade but seems to have recently stabilized at a thickness of 3.3 m. Data concerning lake level and degree-days above freezing are presented to show the relationship between peak summer temperatures and the volume of glacier-derived meltwater entering Lake Hoare each summer. From these latter data it is inferred that peak summer temperatures have been above 0 C for a progressively longer period of time each year since 1972. Also considered are possible explanations for the thinning of the lake ice. The thickness of the ice cover is determined by the balance between freezing during the winter and ablation that occurs all year but maximizes in summer. It is suggested that the factor most likely responsible for the change in the ice cover thickness at Lake Hoare is the extent of summer melting, consistent with the rising lake levels. (Auth. mod.)

F-46438
Palais, J.M., Germani, M.S., Zielinski, G.A., **Inter-hemispheric transport of volcanic ash from a 1259 A.D. volcanic eruption to the Greenland and antarctic ice sheets,** *Geophysical research letters,* Apr. 24, 1992 19(8), p.801-804, 23 refs.

A strong volcanic sulfuric acid signal corresponding to an age of 1259 A.D. has been reported in ice cores from Greenland, Antarctica, and arctic Canada. Tiny (<5 micrometers) volcanic glass shards were reported previously in samples from this layer in an ice core from the South Pole. Here the discovery of volcanic glass shards from a contemporaneous layer in an ice core from Summit, Greenland is reported. The major element composition of the glass shards in the Greenland sample are identical to those from the South Pole, confirming the previous assumption that the sulfuric acid signal in the ice cores is an inter-hemispheric time stratigraphic marker. The composition of these glass shards is similar to those produced by a 550-700 yrs. B.P. eruption of El Chichon volcano in Mexico, suggesting that it may be the source of the widely dispersed material. (Auth. mod.)

F-46441
Liu, C., Qin, D., Wang, X., Qian, S., **Surface flow of Nelson ice cap, West Antarctica,** *Antarctic research (Chinese edition),* Dec. 1991 3(4), p.11-17, In Chinese with English summary. 5 refs.

Based on analysis of the spatial distribution and seasonal variations of the surface flow velocities of the Nelson ice cap, and the non-verticality between the flow vector and the contour at the same point, the strain-rates are explained along profiles N and E through the highest point on the ice cap surface and the relation between the strain rates and crevasses. These characteristics are compared with those of continental ice caps in China to illustrate the marine features of Nelson ice cap in glacier dynamics. Results of velocity measurements and strain-rate tests are discussed and illustrated.

F-46447
Qin, D., **Characteristics of stratigraphy and glaciochemistry on top of the Nelson ice cap, Antarctica,** *Antarctic research (Chinese edition),* Sep. 1991 3(3), p.1-7, In Chinese with English summary. 14 refs.

Snow stratigraphy, seasonal variations, and analysis of ionic concentrations found in samples collected in a snow pit on top of the Nelson ice cap, show that the precipitation impurity concentrations over Nelson I. are higher than those found on the continent. It is suggested that the high concentration of ions on Nelson I. points to environmental pollution caused by human activities, and that the atmospheric processes over the island play an important role in the deposition rate of nitrate, which is similar to that found in other areas of West Antarctica.

F-46448
Chen, S., Zhang, Y., **Snow accumulation and melting processes at the Great Wall Station, Antarctica,** *Antarctic research (Chinese edition),* Sep. 1991 3(3), p.8-14, In Chinese with English summary. 5 refs.

The onset of snow accumulation at the Great Wall Station takes place between Apr. and June, and ends between middle of Aug. and Oct. The maximum thickness of snow cover recorded in 1985, 1986 and 1988 was 1.9 m, 2.2 m and 1.2 m, respectively. The distribution and temperature profiles of snow cover from the top of a hill to the low tide line show that the thickness of snow cover was greatest in the low-lying land; the thickness at the low tide line was 20 cm greater than that at the high tide line; the snow temperature at 20 cm was -0.10 C, and in the lower layers it ranged from -0.23 to -2.10 C. The day-to-day variation of air-snow sensible heat flux from Nov. 15, 1988 to Jan. 5, 1989, is shown in a figure. The snow density measured in early Dec., 1988, at the depths of 0.05-0.10 m, 0.23-0.28 m, 0.33-0.38 m and 0.55-0.60 m was 0.47 g/cu cm, 0.47 g/cu cm, 0.51 g/cu cm and 0.50 g/cu cm, respectively.

F-46449
Kang, J., Li, J., **Environment record comparison of Chinese loess with antarctic ice core for the past 150,000 years,** *Antarctic research (Chinese edition),* Sep. 1991 3(3), p.15-24, In Chinese with English summary. 22 refs.

Study of similarities and differences in Chinese loess deposits, Vostok ice cores, and deep sea sediments shows that environmental conditions between 60,000 a B.P. and 18,000 a B.P. were remarkably similar in China and Antarctica. Literature on the subject is reviewed.

F-46453
Lu, P.D., Zhang, K.C., Huang, F.P., Watanabe, K., **Ecological observations on coloured layer of coastal fast ice in Great Wall Bay, King George Island, Antarctica,** *Antarctic research (Chinese edition),* Sep. 1991 3(3), p.56-63, In Chinese with English summary. 22 refs.

Biological and environmental investigations were carried out in the coastal waters off the Great Wall Station from Nov. 17, 1988, to Mar. 3 1989. Fast ice covered the inner part of the Great Wall Bay until mid Dec.; its thickness ranged from 90 to 70 cm, with about 20 cm of snow cover. An ice core sample collected on Nov. 20 showed a 5-cm brown layer in its middle section. Two brown layers were found in the interior of ice cores collected on Nov. 17, 20 and 26 at a second site. Compared to the water column, chlorophyll *a* concentrations in the fast ice were higher; they ranged from 2.55 to 56.84 mg/cu m. Microalgal assemblages, both in the fast ice and in the water column of the Great Wall Bay, are reported. Their species and relative abundance are shown in a table. (Auth. mod.)

F-46493
Tarabukin, I.A., Galkin, S.I., **Remote radiometric determination of characteristics of artificially compacted snow covers in Antarctica** [Distantsionnoe radiometricheskoe opredelenie kharakteristik iskusstvenno uplotnennykh snezhnykh pokrytiĭ v usloviiakh Antarktidy], *Leningrad [Sankt-Peterburg]. Glavnaia geofizicheskaia observatoriia. Trudy,* 1991 Vol.538, p.57-70, In Russian. 7 refs.

Investigations were conducted in an area of snow airfields for heavy-wheeled airplanes at Molodezhnaya Station and included radiometric and glaciological studies. The interrelationships of the characteristics of thermal microwave emissions of artificially compacted snow with its physical characteristics were studied. Results showed that it is possible to monitor the density characteristics of runways of snow airfields using an existing radiometric device. The radiometer can be used for orientation during movement under conditions of poor visibility.

F-46496
Hughes, T.J., **On the pulling power of ice streams,** *Journal of glaciology,* 1992 38(128), p.125-151, 66 refs.

Ice streams pull ice out of ice sheets and have pulling power equal to the longitudinal gravitational pulling force multiplied by the ice-stream velocity. These boundary conditions beneath and beyond ice streams can be quantified by a basal buoyancy factor that provides a life-cycle classification of ice streams into inception, growth, mature, declining and terminal stages, during which ice streams disintegrate the ice sheet. Surface profiles of ice streams are diagnostic of the stage in a life cycle, and hence of the vitality of the ice sheet. This analysis is applied to selected ice streams in Antarctica. (Auth. mod.)

F-46497

McDonald, J., Whillans, I.M., **Search for temporal changes in the velocity of Ice Stream B, West Antarctica,** *Journal of glaciology,* 1992 38(128), p.157-161, 14 refs.

The position of the UpB camp on Ice Stream B, West Antarctica, has been measured 14 times during three field seasons. TRANSIT (doppler) satellite receivers were used. At the resolution of these measurements (2 m), no significant velocity variation was detected over time intervals ranging from 1 d to 2 years. (Auth. mod.)

F-46498

Weissenberger, J., Dieckmann, G., Gradinger, R., Spindler, M., **Sea ice: a cast technique to examine and analyze brine pockets and channel structure,** *Limnology and oceanography,* Jan. 1992 37(1), p.179-183, 16 refs.

A casting technique was developed to examine the internal structure of sea ice using scanning electron microscopy. After removal of brine by centrifugation at *in situ* temperatures, water-soluble resin is deployed to penetrate drained brine channels of sea ice. The resin is subsequently polymerized under UV light at about -12 C. Freeze-drying eliminates the ice by sublimation, and the hardened casts can be mounted for microscopical analysis. Casts can be used to determine volume and extent of habitable space in different types of sea ice. The extracted brine is available for further studies of sea-ice organisms. Sea ice samples used in this analysis were collected from the Weddell Sea during an RV *Polarstern* cruise in 1989. (Auth.)

F-46501

Cho, K., **MOS-1 multi-sensor data set for sea ice monitoring; Japanese contribution to ISY/PIE Program,** International Geoscience and Remote Sensing Symposium (IGARSS '91), Espoo, Finland, Helsinki University of Technology, June 3-6, 1991. [Proceedings]. Remote sensing: global monitoring for Earth management, Vol.2, New York, Institute of Electrical and Electronics Engineers, Inc., 1991, p.811-814, 6 refs.

Japan's first polar orbiting earth observation satellite series, MOS-1 and MOS-1b, carry three different sensors, which are MESSR, VTIR and MSR. The great advantage of MOS-1 is that it can observe the same phenomena by three different sensors at the same time. In order to contribute to the ISY (International Space Year)/PIE (Polar Ice Extent) Program, NASDA and related agencies in Japan plan to produce a MOS-1 multi-sensor data set of antarctic region, the Okhotsk Sea and the arctic region. This paper describes the use of the data set for sea ice study and monitoring, and the further plan to produce the MOS-1 data set for ISY/PIE. (Auth.)

F-46502

Hawkins, J.D., Laxon, S., Phillips, H., **Antarctic tabular iceberg multi-sensor mapping,** International Geoscience and Remote Sensing Symposium (IGARSS '91), Espoo, Finland, Helsinki University of Technology, June 3-6, 1991. [Proceedings]. Remote sensing: global monitoring for Earth management, Vol.3, New York, Institute of Electrical and Electronics Engineers, Inc., 1991, p.1605-1608, 10 refs.

The remote sensing resources to track and observe the characteristics (shape and height) of antarctic tabular icebergs have advanced significantly. The main observing system of visible and infrared imagery from the polar orbiting satellites is severely limited by clouds and low light levels. These sensor spectral disadvantages are alleviated by using 25 km passive microwave Special Sensor Microwave Imager (SSM/I) data that can detect these huge bergs during adverse weather conditions. Spaceborne altimeters like GEOSAT, while limited to nadir viewing only, are also capable of distinguishing iceberg "hits" due to the change in backscatter and elevation during satellite overflights. Examples combining these three sensors illustrate a means of data fusion, necessary to detect and map tabular icebergs for studies ranging from ocean circulation to potential global climate changes. (Auth.)

F-46503

Ridley, J.K., **Snow properties from passive microwave observations of Antarctica,** International Geoscience and Remote Sensing Symposium (IGARSS '91), Espoo, Finland, Helsinki University of Technology, June 3-6, 1991. [Proceedings]. Remote sensing: global monitoring for Earth management, Vol.4, New York, Institute of Electrical and Electronics Engineers, Inc., 1991, p.2329-2332, 10 refs.

A time series of passive microwave observations by the Special Sensor Microwave/Imager (SSM/I) instrument of the antarctic plateau reveals the annual variation of the snow brightness temperatures at 19 and 37 GHz. The dielectric constant of ice is relatively constant with temperature and frequency, but the observations show significant variation in the brightness temperatures at the two frequencies. This indicates an annual change in surface parameters. The polarization of the microwave emission is seen to be too high to be attributed to surface effects alone and is explained through a model for emission from a layered medium. (Auth.)

F-46504

Rott, H., Sturm, K., **Microwave signature measurements of antarctic firn,** International Geoscience and Remote Sensing Symposium (IGARSS '91), Espoo, Finland, Helsinki University of Technology, June 3-6, 1991. [Proceedings]. Remote sensing: global monitoring for Earth management, Vol.4, New York, Institute of Electrical and Electronics Engineers, Inc., 1991, p.2333-2336, 7 refs.

Emission and backscattering signatures in the C- and X-band as a function of the incidence angle were measured for various types of polar firn during an oversnow traverse leading from the German antarctic station Georg von Neumayer to the plateau of the Amundsen Ice. The polarization behavior and angular dependence of emission and backscattering were found to be strongly dependent on the internal stratification of the snow pack. The largest polarization differences in emitted radiation were observed at the Amundsen Ice, where many pronounced depth hoar layers were found in the top several meters of the snowpack. The field measurements, as well as the analysis of spaceborne microwave radiometer measurements by the Nimbus-7 SMMR and the DMSP SSM/I, show strong deviations from the behavior of a Rayleigh- or Mie-scattering medium, on which models of microwave interaction with snow are based. (Auth.)

F-46506

Oerlemans, J., **Role of ice sheets in the Pleistocene climate,** *Norsk geologisk tidsskrift,* Oct. 1991 71(3), Climate of the northern latitudes: past, present and future. Edited by M. Hald, et al, p.155-161, 30 refs.

Ice sheets have played an important role in the climatic evolution of the Pleistocene. The characteristic time-scale of ice-sheet growth has the same order-of-magnitude as that for the orbital insolation variations. The interaction with the solid earth, the importance of the thermal conditions at the base of ice sheets and feedback on the climate system (albedo feedback, precipitation regime) make the cryospheric response to climatic forcing complicated. Rapid ice-sheet decay, as observed in the paleorecord, must have involved one or more powerful destabilizing mechanisms like low accumulation rates at subpolar latitudes, high ice velocities due to water-saturated sediment beds, and high calving rates in proglacial lakes and seas. In terms of radiative forcing of the global climatic fluctuations in the Pleistocene, the effects of ice sheets (albedo), varying concentration of greenhouse gases (carbon dioxide, methane) and direct effect of orbital changes (insolation) are of similar magnitude. Arctic and antarctic ice sheets are compared. (Auth. mod.)

F-46555

Konishi, H., **Annual variation of snowfall and radar echo structure of snow clouds at Syowa Station, Antarctica,** NIPR Symposium on Polar Meteorology and Glaciology, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1992, p.90-96, 8 refs.

Snow clouds were observed with vertical pointing radar at Showa Station from Feb. 1988 to Dec. 1989. In order to find the *Z-R* relationship, the snowfall rate was directly measured by using an electric balance at the ground. The annual amount of snowfall was estimated to be 400 mm in 1989. The amount of snowfall was 120 mm in spring, 170 mm in the fall, and 70 mm in winter. It was less than 20 mm in summer. Two types of clouds appeared above Showa Station: one had a low cloud top (less than 2 km) and the other had a higher cloud top. The former clouds occurred predominantly in winter and the latter in spring and fall. The higher type clouds are related to the warm front of a low pressure system. The activity of lower type clouds is related to the temperature and humidity in the clouds. These conditions may be connected with the area of sea ice. (Auth.)

F-46556

Konishi, H., ***Z-R* relation for graupels and aggregates observed at Syowa Station, Antarctica,** NIPR Symposium on Polar Meteorology and Glaciology, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1992, p.97-103, 11 refs.

The radar reflectivity factor *Z* and the snowfall rate *R* were measured by a vertical pointing radar and a high sensitivity snow gauge, respectively. From these data, a best fit *Z-R* relation for three snowfall events was found. The diameter and fall velocity of snow particles were also measured at the radar site by using a video camera and an image processor. The types of snow particles described in this paper are aggregates and graupel-like particles, which account for much of snowfall in Antarctica. The range of snowfall rate is similar in all three cases, while the radar reflectivity factor is much different. For the same radar reflectivity factor, the snowfall rate of graupel-like particles was about seven times as large as that for aggregates. (Auth.)

F-46558

Kamiyama, K., Nakayama, E., **Determination of hydrogen peroxide in snow: preliminary results for snow samples in the inland region, Antarctica,** NIPR Symposium on Polar Meteorology and Glaciology, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1992, p.113-119, 15 refs.

Hydrogen peroxide (H2O2) in snow possibly marks annual layers of snow deposition as well as the atmospheric environments where it is created. Methods for the determination of H2O2 in snow and its suitability for field observation are discussed. The vertical plate of a surface snow block obtained on the inland high plateau in Antarctica was analyzed to precisely determine H2O2 distribution. Relatively high concentrations of H2O2 were detected, suggesting seasonal fluctuation. Laminated snow layers of glaciers record past depositional environments. Sufficiently fine sampling intervals of snow, both horizontally (geographically) and vertically, are important to make clear the depositional environments over the glaciers. (Auth. mod.)

F-46559

Satow, K., Watanabe, O., **Distribution of mean delta 0-18 values of surface snow layers and their dependence on air temperature in Enderby Land—East Queen Maud Land, Antarctica,** NIPR Symposium on Polar Meteorology and Glaciology, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1992, p.120-127, 16 refs.

Oxygen isotope analyses of surface snow layers have been carried out in Enderby Land and Queen Maud Land. The delta O-18 values decrease with various parameters, including elevation, distance from the coast, and in particular with mean annual surface temperatures, according to a good linear relationship in the temperature range from -20 to -55 C. The relationship with temperature is similar to that derived from a simple model in which an air mass is progressively cooled under Rayleigh conditions as it moves toward the inland plateau. This also suggests that delta O-18 values are closely related to condensation temperature at the top of the inversion layer where snow precipitation is formed. (Auth.)

F-46560

Takahashi, S., Endoh, T., Azuma, N., Meshida, S., **Bare ice fields developed in the inland part of Antarctica,** NIPR Symposium on Polar Meteorology and Glaciology, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1992, p.128-139, 11 refs.

Observations of a bare ice field were carried out at Seal Rock in the Sör Rondane area. A large sublimation rate, 200 to 280 mm/a, was observed on the bare ice field. Air temperature on the bare ice was about 1 C higher than that on the snow surface. The large sublimation rate was explained by the low albedo of bare ice; its value was roughly estimated from heat budget considerations. The bare ice fields were classified into 4 types according to origin. (Auth.)

F-46561

Furukawa, T., Watanabe, O., Seko, K., Fujii, Y., **Distribution of surface conditions of ice sheet in Enderby Land and East Queen Maud Land, East Antarctica,** NIPR Symposium on Polar Meteorology and Glaciology, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1992, p.140-144, 9 refs.

Data on surface features collected by the Japanese Antarctic Research Expedition (JARE) along traverse routes were compiled to understand their aerial distribution in Enderby Land and East Queen Maud Land. This area can be divided into three regions on the basis of the regional characteristics of surface features. The results will be useful for deducing the aerial distribution of surface features from satellite images. (Auth.)

F-46562

Mitani, A., Shoji, H., Fujii, Y., **Air bubble formation process observed in the G6 antarctic ice core,** NIPR Symposium on Polar Meteorology and Glaciology, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1992, p.145-149, 5 refs.

Air bubble formation processes were investigated on a 100 m-long ice core from G6, Antarctica. The observational results revealed clearly the five-stage process of air bubble entrapment. The pore space was closed off at a depth of 72 m, which yields about a 470 year age difference between air bubbles and the ice, estimated under an assumption of 9 cm of ice/year as the accumulation rate. (Auth.)

F-46563
Shoji, H., Murata, K., Fujii, Y., **Ice layer observations in the G6 antarctic ice core,** NIPR Symposium on Polar Meteorology and Glaciology, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1992, p.150-155, 4 refs.

Ice crust layer studies were carried out on a 100 m-long ice core from G6, Antarctica. Light table observations were conducted to measure the depth, thickness, orientation and shape of each ice layer. The results were analyzed for the depth variations to obtain information on past ice sheet surface conditions. No indication was obtained of any distinctive change in snow surface conditions for the last several hundred years at the G6 site. (Auth.)

F-46569
Robinson, W.H., Haskell, T.G., **Travelling flexural waves in the Erebus Glacier Tongue, McMurdo Sound, Antarctica,** *Cold regions science and technology,* June 1992 20(3), p.289-293, 20 refs.

The Erebus Glacier Tongue in McMurdo Sound has been the subject of numerous theoretical and experimental investigations which have assumed that the observed alternating strains are standing waves. Since Nov. 1984 the strain of the Erebus Glacier Tongue has been monitored with two strain meters placed on either side of the Tongue, and more recently with strain meters along the Tongue. These data imply that flexural- gravity waves are travelling from the snout with a phase speed of 70 +/- 10 m/s and a wavelength of 3.5 +/- 0.5 km. It is suggested that these waves are generated by surface gravity waves or seiches which, when resolved along the Tongue, produce waves travelling near the minimum phase speed for flexural-gravity waves. These observations do not support standing wave theories for the calving of glacier tongues, but suggest that the calving of the Erebus Glacier Tongue on Mar. 1, 1990 occurred when sea waves produced a large lateral force on the Tongue while it was exposed to open water. (Auth. mod.)

F-46577
Suttie, E.D., Wolff, E.W., **Preconcentration method for electrothermal atomic absorption spectrometric analysis for heavy metals in antarctic snow at sub ng/kg levels,** *Analytica chimica acta,* Mar. 20, 1992 258(2), p.229-236, 17 refs.

An improved technique for concentrating heavy metals onto the surface of tungsten wires, prior to analysis by electrothermal atomic absorption spectrometry, is reported. Ultraclean methods and materials described here have enabled improvements in detection limits to be realized. With the new procedure, detection limits of 0.01 ng Cd/kg, 0.47 ng Cu/kg, 0.22 ng Pb/kg and 0.24 ng Zn/kg are obtained. These are low enough to allow analysis of ancient and modern antarctic snow, except perhaps for cadmium. A comparison with samples injected directly into the graphite furnace shows good agreement, confirming that the method is suitable for the simple polar snow matrix. (Auth.)

F-46596
Yao, T.D., Petit, J.R., **Ice crystal measurement and its climatic significance of a marginal ice core from East Antarctica,** *Journal of glaciology and geocryology,* Mar. 1992 14(1), p.11-17, In Chinese with English summary. 12 refs.

Ice crystals were measured from a marginal ice core from East Antarctica. The climatic significance related to ice crystals was discussed. A comparison was made between the Dunde ice core results and other ice core results. Based on the changes of ice crystals along the depth and the abrupt changes of ice crystals during the last Ice Age, it was concluded that climate can not only affect the growth rate of ice crystals, but also affect ice crystal size under specific climatic condition (e.g. last Ice Age). The fact that climatic information can be preserved in the marginal ice of an ice sheet indicates that the conclusion that ice crystal growth rate can be influenced by ice surface temperature memory also applies to marginal ice of an ice sheet.

F-46597
Lorius, C., **Polar ice cores—climatic and environmental records,** *Journal of glaciology and geocryology,* Dec. 1991 13(4), p.283-289, In Chinese with English summary. 15 refs. For another version see 46-3222 or F-46039.

Ice cores from Greenland and Antarctica provide multiple proxy records of climate and environmental parameters. They show evidences of anthropogenic impact on atmospheric greenhouse gases. Increase over the last 200 years is 20% for CO2, 8% for N2O and more than 200% for CH4. The antarctic Vostok ice core has shown signatures of the insolation orbital forcing as well as a close association between temperature and greenhouse gas concentrations; CO2 and CH4 concentrations respectively increase by about 40% and 100% during glacial-interglacial climate changes by amplifying, together with the growth and decay of the Northern Hemisphere ice sheets, the orbital forcing. Climate sensitivity to greenhouse forcing estimated from paleo-ice core data is consistent with GCM simulations giving a 3-4 C warming for a future doubled atmospheric CO2. (Auth. mod.)

F-46648
Kotliakov, V.M., ed, Ushakov, A., ed, Glazovskiĭ, A.F., ed, **Glaciers-ocean-atmosphere interactions,** *IAHS publication,* 1991 No.208, 549p., Refs. passim. Proceedings of the International Symposium held at St. Petersburg, 24-29 September 1990. For individual papers see 46-4601 through 46-4655 or F-46649 through F-46661, F-46663 through F-46668 and I-46662.

This is a collection of papers presented at the International Symposium on Glaciers-Ocean-Atmosphere Interactions, held in St. Petersburg, USSR, Sep. 24-29, 1990. The Symposium identified a number of glacial phenomena related to interactions in the geosphere, which should be regarded as indicators of global change and/or as causes of large-scale variations. The papers presented in this volume were selected according to the Symposium topics, as follows: ice cores as indicators of global changes; sea ice in the global interaction system; modelling of ice sheets and their components; glaciation and the global sea level; ice cores and ice chemistry; mass- and heat-balance; paleovariations; ice in the water; and glaciation-atmosphere interaction.

F-46649
Vaĭkmiae, R.A., **Deciphering recent structures and Holocene evolution of the marginal East Antarctic ice cover in Queen Maud Land,** *IAHS publication,* 1991 No.208, Glaciers-ocean-atmosphere interactions. Edited by V.M. Kotliakov, A. Ushakov, and A. Glazovskiĭ, p.3-14, 11 refs.

The isotopic composition of ice, firn and snow from northern Queen Maud Land has been studied for deciphering recent structures and Holocene evolution of this marginal area of East Antarctica. The 809 m oxygen isotope profile of the firn glacier with identifiable annual layers of about 20 cm of ice up to 600 m represents a unique record of the last 7000-8000 years for this region, reflecting all the main climatic changes during this time interval. Isotopic analysis of samples from the ice cover at the south periphery of the Schirmacher Ponds shows that under the Holocene ice there are some decameter thick relics of the Pleistocene ice cover with delta O-18 values of -38 to -48%. (Auth.)

F-46650

Kotliakov, V.M., **Global changes over the last climatic cycle from antarctic ice core records,** *IAHS publication,* 1991 No.208, Glaciers-ocean-atmosphere interactions. Edited by V.M. Kotliakov, A. Ushakov, and A. Glazovskiĭ, p.15-27, 22 refs.

Isotopic temperature records of the Vostok ice core (2546 m deep) depicted two interglacial periods around 140 and 15 kyr B.P. with sharp warmings of 11 C and 9 C and a long glacial period (110-15 kyr B.P.), which included two interstadials. During coolings the snow accumulation decreased by a factor of two, the aerosol concentration increased 10-20 times and the CO2 content in the atmosphere decreased by 25-30%. The coolings were accompanied by enhanced atmospheric circulation, in particular of meridional transport. Spectral analyses of temperature and CO2 records showed the relationship between Pleistocene climate, orbital factors (obliquity, precession, eccentricity) and CO2 concentration changes. (Auth.)

F-46651

Lorius, C., **Greenhouse warming, climate sensitivity and Vostok data,** *IAHS publication,* 1991 No.208, Glaciers-ocean-atmosphere interactions. Edited by V.M. Kotliakov, A. Ushakov, and A. Glazovskiĭ, p.29-47, Refs. p.44-47.

One of the main problems in estimating the possible climatic impact of doubled atmospheric CO2 from Global Circulation Models (GCMs) is to evaluate the sensitivity of the Earth's climate. In this respect, valuable empirical data are provided by climate and greenhouse gas concentration records obtained from the Vostok ice core over the last climatic cycle. The temperature profile and CO2-CH4 concentrations are closely related to significant increases of CO2 (200 to 280 ppmv) and CH4 (doubled) associated with glacial-interglacial transitions. A statistical approach shows that temperature changes can be essentially explained by a Milankovich type forcing associated with a greenhouse gas forcing. This result is in agreement with GCM simulations of the Last Glacial Maximum, both on a local (Vostok) and global scale. (Auth.)

F-46652

Martinerie, P., Raynaud, D., Lipenkov, V.IA., Barkov, N.I., **Total gas content in ice cores: paleoaspects,** *IAHS publication,* 1991 No.208, Glaciers-ocean-atmosphere interactions. Edited by V.M. Kotliakov, A. Ushakov, and A. Glazovskiĭ, p.71-72, 3 refs.

Total gas content (V) of ice has been used in earlier works as an indicator of ice sheet (Antarctica, Greenland) thickness variations related to the last glacial-interglacial transition between about 18 and 10 kyr B.P. The Vostok ice core offers a unique opportunity for investigating V changes in the central part of East Antarctica over a full climatic cycle (approximately the last 150,000 years).

F-46653

Briazgin, N.N., Dement'ev, A.A., Lubarskiĭ, A.N., **Model of the interaction of atmosphere-ocean-ice cover in the polar regions of the Earth,** *IAHS publication,* 1991 No.208, Glaciers-ocean-atmosphere interactions. Edited by V.M. Kotliakov, A. Ushakov, and A. Glazovskiĭ, p.85-94, 13 refs.

Investigation of the impact of radiation, thermal and circulation factors on ice cover variations of the western part of the Arctic and the Sodruzhestvo (Friendship) Sea located symmetrically in the Northern and Southern Hemispheres, was made, using a mathematical modelling method. A log-power model was used to account for the asynchronism and non-linearity of the interrelations. This model gives values more representative of the initial row than does the linear multiple regression method, and may be used for the analysis of interaction parameters of the polar regions climatic system. (Auth.)

F-46654

Ackley, S.F., **Growth, structure and properties of antarctic sea ice,** *IAHS publication,* MP 3114, 1991 No.208, Glaciers-ocean-atmosphere interactions. Edited by V.M. Kotliakov, A. Ushakov, and A. Glazovskiĭ, p.105-117, 20 refs.

The Weddell Gyre region is one of the more complex areas of sea ice processes in Antarctica. In the western part of the region, the pack ice persists year-round, caused by a vigorous generation and circulation of the ice, controlled by the atmospheric and ocean current forcing that is turned northward by the topographic boundary of the Antarctic Peninsula. The dynamical character of the pack ice affects the ice thickness characteristics, with the oldest, thickest ice appearing in the northwest outflow region of the western pack ice. In the eastern part, the pack is seasonal rather than perennial. The primary origin of the pack ice (0.6 m of mean ice thickness) is the rapid formation of pancake ice, controlled by the temperature and ocean wave regime at the ice edge during the advance period. (Auth.)

F-46655

Kamb, B., Engelhardt, H., **Antarctic Ice Stream B: conditions controlling its motion and interactions with the climate system,** *IAHS publication,* 1991 No.208, Glaciers-ocean-atmosphere interactions. Edited by V.M. Kotliakov, A. Ushakov, and A. Glazovskiĭ, p.145-154, 45 refs.

A program of borehole geophysical measurements at the base of West Antarctic ice streams has thus far obtained from Ice Stream B some observations of temperature, basal water pressure, hydraulic parameters of the basal water system, properties of subglacial till including minimum thickness, porosity, lithology, strength, hydraulic conductivity, and incomplete observations of basal sliding and *in situ* till deformation. The base of Ice Stream B is at the melting point, the basal water pressure is within about 1 bar of the overburden pressure, and deformable subglacial till at least 3 m thick is present under the ice. These conditions favor rapid basal sliding and rapid bed deformation as ice-stream flow mechanisms. A quantitative understanding of them is needed to consider the interaction of the ice streams with the climate system. (Auth.)

F-46656

Chashchinov, IU.M., Rakhmanov, A.E., **Type of plastic deformation of ice in glacier sheets,** *IAHS publication,* 1991 No.208, Glaciers-ocean-atmosphere interactions. Edited by V.M. Kotliakov, A. Ushakov, and A. Glazovskiĭ, p.155-159, 11 refs.

The results of an experimental investigation of ice structure and texture are analyzed. It is concluded that a scheme of the strained state of ice can be defined on the basis of this analysis. The types of processes leading to variations in the spatial structure of ice are also defined. (Auth.)

F-46657

Doake, C.S.M., Vaughan, D.G., **Breakup of Wordie Ice Shelf, Antarctica,** *IAHS publication,* 1991 No.208, Glaciers-ocean-atmosphere interactions. Edited by V.M. Kotliakov, A. Ushakov, and A. Glazovskiĭ, p.161-165, 12 refs.

Wordie Ice Shelf has been steadily retreating since the mid-1960s, with a big breakout between 1988 and 1989. A study of satellite images taken since 1974 shows that increased crevassing and rifting is responsible for increased ice front calving, and for weakening the ice shelf upstream from the ice rises and in the center portion. A warming recorded in mean annual air temperatures in the Marguerite Bay area has probably caused the mass balance to shift from net accumulation to net ablation, pushing the ice shelf into an unfavorable climatic regime. (Auth.)

F-46658

Jenkins, A., **Gravity currents beneath ice shelves,** *IAHS publication,* 1991 No.208, Glaciers-ocean-atmosphere interactions. Edited by V.M. Kotliakov, A. Ushakov, and A. Glazovskiĭ, p.177-182, 16 refs.

Large-scale oceanic circulation beneath antarctic ice shelves is driven by the thermohaline differences which result from mass and energy exchange at the ice-ocean interface. Dense saline waters are drawn underneath the ice shelves and emerge, cooled and diluted, as plumes of Ice Shelf Water. A simple one-dimensional model of this process has been developed, in which the Ice Shelf Water plume is treated as a turbulent gravity current, initiated at the inland margin by a flow of fresh meltwater emerging from beneath the grounded ice. Subsequent evolution of the plume, as it ascends along a base of specified geometry, can be simulated. The model has been applied to a flowline on Ronne Ice Shelf, where steady-state melt rates have been derived from glaciological measurements. (Auth.)

F-46659

Salamatin, A.N., **Ice sheet modelling taking account of glacier ice compressibility,** *IAHS publication,* 1991 No.208, Glaciers-ocean-atmosphere interactions. Edited by V.M. Kotliakov, A. Ushakov, and A. Glazovskiĭ, p.183-192, 9 refs.

Mathematical aspects are examined in the matter of glacier dynamics theory generalization with regard to subsurface firn thickness, compressibility and densification effects, including considerations of the antarctic ice sheet conditions. (Auth. mod.)

F-46660

Zakharov, V.G., **Dynamics of antarctic glaciers in the twentieth century,** *IAHS publication,* 1991 No.208, Glaciers-ocean-atmosphere interactions. Edited by V.M. Kotliakov, A. Ushakov, and A. Glazovskiĭ, p.209-215, 14 refs.

An analysis of geographic, cartographic, and space data showed that during the last 100 years ice shelves and outlet glaciers of the Antarctic advanced erratically in 1902-1915, in the second half of the 1930s, at the end of the 1940s and 1950s, in 1965-1975, and in the early 1980s. The advance of glaciers alternated with their retreat and had the character of surges. On the basis of the available data on interrelated processes in the atmosphere-ocean-antarctic glaciers system, the periods of calving of glaciers may be used as indicators of changes in the intensity and character of atmospheric circulation. (Auth.)

F-46661

Zakharov, V.G., Khmelevskaia, L.V., **Fluctuations of antarctic glaciers and planetary atmospheric processes,** *IAHS publication,* 1991 No.208, Glaciers-ocean-atmosphere interactions. Edited by V.M. Kotliakov, A. Ushakov, and A. Glazovskiĭ, p.217-220, 6 refs.

Data show that from 1891 until 1970, the multi-year duration of spring and pre-winter circulation seasons of the Northern Hemisphere, the snow accumulation in the region of Dome C in Antarctica, and fluctuations of antarctic glaciers, all correlate quite well, reflecting the planetary character of atmospheric processes. They develop synchronously in the Northern and Southern Hemispheres and show themselves quite clearly in the seasonal reconstructions of barometric fields of the Earth.

F-46663

Jouzel, J., **Last deglaciation in Antarctica; evidence of a "Younger Dryas" type climatic event,** *IAHS publication,* 1991 No.208, Glaciers-ocean-atmosphere interactions. Edited by V.M. Kotliakov, A. Ushakov, and A. Glazovskiĭ, p.269-283, 45 refs.

The Younger Dryas was a cold event which occurred during the last climatic transition, following the warming trend of the Bölling-Alleröd and spanning approximately a millennium from 11 to 10.2 kyr B.P. Isotopic Dome C results have shown that the transition was a two-step process, with two warming trend periods interrupted by a slightly colder period estimated to have taken place from about 13.2 to 11.7 kyr B.P. This cooling event is also well indicated in the Vostok record, but during a time interval preceding the Younger Dryas by about 1 kyr. Recent measurements of methane and dust concentration in the Vostok core are discussed as useful information for linking Northern and Southern Hemisphere observations. (Auth.)

F-46664

Hermichen, W.D., Kowski, P., Hahne, K., Vaĭkmiae, R.A., **Late Quaternary glacio-climatic history of an East Antarctic ice sheet margin: indications from ice-cored moraines in Central Queen Maud Land,** *IAHS publication,* 1991 No.208, Glaciers-ocean-atmosphere interactions. Edited by V.M. Kotliakov, A. Ushakov, and A. Glazovskiĭ, p.285-289, 4 refs.

Studies of old moraines, covering the northern flanks of the mountains in central Queen Maud Land, have revealed relict ice from former higher glacier-surface levels inside lateral morainic ridges of successively older ages. As compared to the isotopic composition of the recent regional ice cover, these relics are depleted in oxygen-18 by 5-12%. The isotope data indicate that during the Late Quaternary, increases of the regional ice volume were linked with cold (sub-) stages exclusively, during which the mean annual temperature was reduced by 4-10 C. A joint interpretation of data enables the glacio-climatic history of the area to the south of the Georg Forster Station to be traced. (Auth.)

F-46665

Pisarevskaia, L.G., Popov, I.K., **Free-drifting icebergs and thermohaline structure,** *IAHS publication,* 1991 No.208, Glaciers-ocean-atmosphere interactions. Edited by V.M. Kotliakov, A. Ushakov, and A. Glazovskiĭ, p.447-454, 15 refs.

During three expeditions, temperature and salinity measurements around free drifting icebergs were made in the Arctic and the Antarctic. Relevant information on fluid dynamics applied to the isopycnal structure typical of the studied icebergs suggests that the interaction of a moving iceberg with the oceanic stratification leads to internal wave generation. Wave-induced Kelvin-Helmholtz instability and turbulent mixing may affect the ocean heat flux. (Auth.)

F-46666

Romanov, A.A., Korotkov, A.I., **Role of sea ice in the system of interaction media in the Southern polar region,** *IAHS publication,* 1991 No.208, Glaciers-ocean-atmosphere interactions. Edited by V.M. Kotliakov, A. Ushakov, and A. Glazovskiĭ, p.471-477, 18 refs.

The concept of antarctic ice cover evolution is formulated. Periods of two or three years prevail in the year-to-year variations of ice coverage in the southern ocean. The intra-Antarctic, an energy-active zone formed by recurring polynyas, is one of the generators of ice cover extent variations. (Auth.)

F-46667

Arapov, P.P., Krigel', A.M., Odintsov, V.A., **Study of the greenhouse effect on the antarctic ice cap,** *IAHS publication,* 1991 No.208, Glaciers-ocean-atmosphere interactions. Edited by V.M. Kotliakov, A. Ushakov, and A. Glazovskiĭ, p.481-487, 4 refs.

The significant influence of solar radiation on the thermal conditions of ice near Vostok Station was studied, using both direct measurements and numerical simulation. From this, the greenhouse effect of solar radiation on ice, diurnal variations of heat flux at different depths, as well as heat balance components on an ice surface, were estimated. (Auth.)

F-46668

Losev, K.S., **Ice sheets and atmospheric CO2,** *IAHS publication,* 1991 No.208, Glaciers-ocean-atmosphere interactions. Edited by V.M. Kotliakov, A. Ushakov, and A. Glazovskiĭ, p.527-528, 3 refs. Extended abstract.

A hypothesis is proposed which is an attempt to explain the rapid disintegration of the last glaciation followed by a very warm climate optimum.

F-46679

Grousset, F.E., **Antarctic (Dome C) ice-core dust at 18 k.y. B.P.: isotopic constraints on origins,** *Earth and planetary science letters,* June 1992 111(1), p.175-182, 28 refs.

The source area has been determined from which dusts from the Last Glacial Maximum (LGM) section of the Dome C ice core were derived, by comparing their strontium and neodymium isotopic ratios with those of samples from potential source areas. The SR-87/Sr-86 and Nd-143/Nd-144 isotope ratios of the dusts deposited about 18 k.y. B.P. at the east antarctic Dome C site were compared with potential antarctic, Australian, southern African and South American sources. The isotope ratios clearly define the Patagonian provenance of the dust, with the other potential source areas being, at most, minor contributors. Contributions by volcanic ash and tephra to the dust sample were also determined to be minimal, based on the patterns of rare earth elements. Knowing the source of the dust places constraints on the aeolian trajectory by which it was transported to Antarctica, and this serves as a test of the simulation of southern hemispheric circulation by atmospheric global circulation models during the LGM. (Auth.)

F-46688

Tohjima, Y., Tominaga, T., Makide, Y., Fujii, Y., **Determination of methane concentration in air extracted from antarctic ice core samples,** *Chemical Society of Japan. Bulletin,* Nov. 1991 64(11), p.3457-3459, 15 refs.

A convenient method was developed for determination of methane concentration in old air trapped in antarctic ice core samples. The air was extracted with a stainless steel bellows pump after quick refreezing of melted ice samples, and the methane was measured with a gas chromatograph with a flame ionization detector. The averaged methane concentration in the Mizuho ice core at a depth of 330 m (ca. 3600 BP, 11 samples) was 750 +/- 20 ppbv. (Auth. mod.)

F-46690

Whitlow, S., Mayewski, P.A., Dibb, J.E., **Comparison of major chemical species seasonal concentration and accumulation at the South Pole and Summit, Greenland,** *Atmospheric environment,* Aug. 1992 26A(11), p.2045-2054, 57 refs.

High-resolution snow chemistry records have been recovered from a site close to the South Pole, covering the period 1955-1989, and from Summit, Greenland for the periods 1979-1987 and 1259-1989. The seasonal variation of the major ions relative to *Delta*O-18 and their average yearly fluxes are compared for the two sites. Comparisons are also made to limited available aerosol data. Gaseous species and some species with gaseous precursors (NO3, NH4 and excess Cl) have similar timings in South Pole and pre-1900 Summit snow. Timing of non-sea-salt (nss) SO4 and species that are generated as marine and crustal aerosols (Na, nss Mg and nss Ca) differ between the two sites. The timing of nss SO4 and NO3 is complicated in recent precipitation at Summit, Greenland, by the impact of anthropogenic emissions. Fluxes of sea-salt species, nss SO4 and NO3 (pre-1900 values for Summit) are less than a factor of 2 higher at Summit. Species with a continental source: nss K, nss Mg, nss Ca and NH4 are more than five-fold higher at Summit. (Auth. mod.)

F-46712

Potts, W.T.W., Oates, K., Wolff, E.W., Mulvaney, R., **Distribution of impurities in antarctic ice,** *Scanning microscopy,* Mar. 1992 6(1), p.295-299, 12 refs.

Antarctic snow and ice contain very low concentrations of ions, <10 micromole/l Na, Cl and SO4, but these ions may play a significant part in determining the physical properties of the ice and atmospheric chemistry. At the temperatures pertaining in the Antarctic, sulphuric acid would still be liquid and information on the distribution of these ions, whether they are disseminated through the crystals or concentrated in a liquid phase at the triple junctions between the crystals, is essential in order to model some of the physical properties of the ice, including electrical conductivity, rigidity and transparency to radar. Samples of 125 year old ice from the Antarctic Peninsula were planed with a sledge microtome, coated with 23 nm of Al and maintained at -160 C in a scanning electron microscope. X-ray emission analysis of areas 1 micron square showed that S was concentrated at the triple junctions. At the temperature of the ice-sheet, -16.5 C, the sulphuric acid would be a liquid in equilibrium with the ice at a concentration of about 2.6 mole/l, but when frozen rapidly to stage temperature it would form vitreous ice at a concentration of 2.6 mole/l or it might be further concentrated to its eutectic of 4.9 mole/l. No Na or Cl were detected either at the triple junctions or elsewhere in the ice crystal. An understanding of the processes involved in the distribution and segregation of the ions, in both the atmosphere and the ice sheet, will be necessary in order to model atmospheric and ice sheet chemistry and physics. (Auth. mod.)

F-46739

Oerter, H., **Evidence for basal marine ice in the Filchner-Ronne ice shelf,** *Nature,* July 30, 1992 358(6385), p.399-401, 18 refs.

The Filchner-Ronne Ice Shelf, which drains most of the marine-based portions of the West Antarctic ice sheet, is the largest ice shelf on Earth by volume. The origin and properties of the ice that constitutes this shelf are poorly understood, because a strong reflecting interface within the ice and the diffuse nature of the ice-ocean interface make seismic and radio echo sounding data difficult to interpret. Ice in the upper part of the shelf is of meteoric origin, but is has been proposed that a basal layer of saline ice accumulates from below. Here the authors present the results of an analysis of the physical and chemical characteristics of an ice core drilled almost to the bottom of the Ronne Ice Shelf. The authors observe a change in ice properties at about 150 m depth, which is ascribed to a change from meteoric ice to basal marine ice. The basal ice is very different from sea ice formed at the ocean surface, and suggests a formation mechanism in which ice platelets in the water column accrete to the bottom of the ice shelf.

F-46755
Watanabe, O., Fujii, Y., Nishio, F., Motoyama, H., **Position, elevation, ice thickness and bedrock elevation of stations along the routes in East Queen Maud Land and Enderby Land, East Antarctica,** *Japanese Antarctic Research Expedition. JARE data reports,* Mar. 1992 No.180, 143p., 12 refs.

This volume contains data obtained during oversnow traverses carried out by the Japanese Antarctic Research Expedition in East Antarctica. A route map is provided, and information concerning surface elevation, ice thickness and bedrock elevation measured along the routes is presented in tables.

F-46756
Watanabe, O., Fujii, Y., Motoyama, H., **Results of analyses of Mizuho 700 m ice core, East Antarctica. Part 1. Delta 0-18, microparticles, ECM (acidity), pH, major ions,** *Japanese Antarctic Research Expedition. JARE data reports,* Mar. 1992 No.181, 79p., 17 refs.

In 1983-1984, glaciological survey parties of the 24th and 25th Japanese Antarctic Research Expedition (JARE) carried out ice-coring down to a depth of 700.56 m at Mizuho Station. The results of core analysis were published in many journals, but they dealt mainly with the physical analysis of the core. This volume presents the data of delta O-18, microparticles, ECM (acidity), pH and major ions. Analytical procedures are described.

F-46774
Richter-Menge, J.A., **Compressive strength of frazil sea ice,** MP 3121, IAHR Symposium on Ice, 11th, Banff, Alberta, Canada, June 15-19, 1992. Proceedings. Vol.2, 1992, p.1065-1074, 12 refs.

Unconfined, uniaxial compressive strength tests were performed on frazil sea ice samples collected in the Weddell Sea. The tests were done at constant strain rates ranging from .01 to .00001/s and temperatures of -5 and -10 C. These conditions covered the brittle-to-ductile transition of this ice type. Results of the tests are presented and the compressive strength of the frazil samples is compared to the strength of transversely isotropic columnar saline ice loaded perpendicular to the growth direction. This analysis indicates that the strength of the frazil and columnar ice is comparable at a given porosity. The author discusses this finding with respect to the variations in the structural characteristics of each ice type. In particular, the influence of grain size and the spacing of brine inclusions are considered. (Auth.)

F-46776
U.S. Naval Polar Oceanography Center, **Antarctic ice charts 1989-1990,** Suitland, MD, 1992, n.p. ADA-249 730.

A compilation of the weekly sea ice analyses produced by the Navy/NOAA Joint Ice Center. The Antarctica Ice Charts are produced bi-annually every even numbered year (i.e. 1990, 1992 etc.) by June or July.

F-46843
Kottmeier, C., Engelbart, D., **Generation and atmospheric heat exchange of coastal polynyas in the Weddell Sea,** *Boundary-layer meteorology,* Aug. 1992 60(3), p.207-234, 30 refs.

The forcing mechanisms for antarctic coastal polynyas and the thermodynamic effects of existing polynyas were studied by means of an air-sea-ice interaction experiment in the Weddell Sea in Oct. and Nov. 1986. From the momentum balance of drifting sea ice, a forcing diagram is constructed, which relates ice motion to the surface-layer wind vector and to the geostrophic ocean current vector. In agreement with the data, wind forcing dominates when the wind speed at a height of 3 m exceeds the geostrophic current velocity by a factor of at least 33. This condition within the ocean regime of the antarctic coastal current usually is fulfilled for wind speeds above 5 m/s at a height of 3 m. The turbulent heat exchange between sea ice and polynya surfaces is derived from surface-layer wind and temperature data, from temperature changes of the air mass along its trajectory and from an application of the resistance laws for the atmospheric planetary boundary layer (PBL). The turbulent heat flux averaged over all randomly distributed observations in coastal polynyas is 143 W/sq m, a value significantly different over pack ice and shelf ice surfaces, where downward fluxes prevail. The large variances of turbulent fluxes can be explained by variable wind speeds and air temperatures. The heat fluxes are also affected by cloud feedback processes, and vary in time due to the formation of new ice at the polynya surface. Maximum turbulent fluxes of more than 400 W/sq m result from strong winds and low air temperatures. The heat exchange is similarly intense in a narrow zone close to the ice front, when under weak wind conditions a local circulation develops, and cold air associated with strong surface inversions over the shelf ice is heated above the open water. (Auth. mod.)

F-46844
Eraso, A., Antiguedad, I., Mangin, A., **Time series correlogramme and spectral analysis of the Cazadora Glacier drainage and meteorological parameters, Spanish Antarctic Base (BAE), Livingston Island (South Shetland, Antarctic),** International Symposium of Glacier Caves and Karst in Polar Regions, 1st, Madrid, Oct. 1-5, 1990. Proceedings. Edited by A. Eraso, Madrid, Instituto Tecnológico GeoMinero de España, 1991, p.69-91, With French and Spanish summaries. 8 refs.

The authors analyze the hydrogram characteristics of the river close to the Spanish Antarctic Base Juan-Carlos I which drains the Cazadora glacier. These data had been obtained by a limnigraph in Feb. 1989, and by establishing the discharge curve calculated by watermill daily measurements. The hydrogram shapes are explained and cause-effect relationships are found between glacier discharge and meteorological parameters, i.e. air temperature, atmospheric pressure, precipitation, relative humidity and insolation. Correlation and spectral analysis enabled the authors to fix these relationships. (Auth. mod.)

F-46848
Li, J., Young, N.W., Wookey, C.W., **Stratigraphy, density and crystal structure of firn-ice at DE08—a very high accumulation site on Law Dome, Antarctica,** *Antarctic research,* Dec. 1991 2(2), p.1-14, 23 refs.

An approximately 195 mm diameter firn/ice core, 234 m long, was thermally drilled and analyzed in 1987 austral summer at Law Dome. The snow stratigraphy is characterized by the lack of coarse-grained snow and other distinctly visible features normally corresponding to the annual layers. There is a smooth transformation from fine-grained snow at shallow depth to ice at about 80-90 m, which is greater than that at most other polar locations, due to its abnormally high accumulation rate. According to the marked change in the trend of density with depth and in the crystal properties, 4 stages of the transformation of snow to ice and development of crystal structure can be distinguished: settling stage (0-10 m); sintering stage (10-90 m); rapid crystal growth stage (90-170 m); and dynamic metamorphism stage (170-234 m). The rates of densification and crystal growth from the surface to the depth of the firn-ice transition closely depend on the general temperature. Below the transition zone, the crystal growth rate is higher by a factor of 4.3 in comparison with that at other sites. (Auth. mod.)

F-46849

Kang, J.C., Wen, J.H., **Comparison: Palaeoenvironmental change record of Chinese loess and antarctic ice cores over the last 150,000 years,** *Antarctic research,* Dec. 1991 2(2), p.15-23, 21 refs.

Studies of Chinese loess and a comparison with antarctic ice cores provide a general pattern of global environmental change and regional differentiation over the last 150,000 years. Climatic changes revealed by magnetic susceptibility of the Linxia loess section in China were parallel to temperature variations revealed by delta D of the Vostok ice core over the last 150,000 years, which indicates a pattern of climatic change tendencies on a long scale. The ranges of variation during the last Interglacial age have greater differences between these two records. When compared with deep sea records, marine and terrestrial environmental records are markedly different in the early and late stages of the last Glaciation. (Auth. mod.)

F-46851

Ren, J.W., Qin, D.H., Huang, M.H., **Thermal properties and temperature distribution of snow/firn on the Law Dome ice cap, Antarctica,** *Antarctic research,* Dec. 1991 2(2), p.38-46, 14 refs.

Based on detailed measurements of density and numerous data on temperature in shallow boreholes (about 20 m deep), the thermal properties and temperature distribution of snow/firn layer on the Law Dome ice cap are discussed. According to a review of works on thermal properties of snow by Yen (1981), a relationship between thermal conductivity (K) and density (rho) is proposed. An equation of heat transfer in a deformed nonuniform medium is applied and solved analytically by two approaches. Comparison of calculated and measured temperatures indicates that the difference depends mainly on the determination of boundary conditions. (Auth. mod.)

F-46867

Whung, P.Y., **Study of methanesulfonic acid in ice cores,** Coral Gables, University of Miami, 1991, 173p., University Microfilms order No. 92-01127, Ph.D. thesis. Refs. p.130-152.

Methanesulfonic acid (MSA), an oxidation product of DMS, has been used as a biogenic sulfur tracer in deposited snow layers to better understand the relative importance of various sulfur inputs (biogenic, volcanic and anthropogenic sulfur) to both polar regions in the past. The ice cores and snowpit samples were collected from the 20D site (Greenland) and the Dominion Range site (Antarctica). A suppressed ion chromatographic method was used to measure MSA in snow and ice. The mean concentrations of MSA in the Dominion Range snowpit and ice core are 2.76 ppb and 0.94 ppb, respectively. The mean MSA/total S(VI) ratio is below 1% at the Dominion Range site. These data confirm that the MSA fraction in the high plateau is considerably lower than in coastal Antarctica and in the low- and the high-latitude marine boundary layer. Possible causes include volcanic sulfate input, long range transport of low-latitude biogenic sulfur, and additional stratospheric sulfate input. In summary, all of the above suggests that transport-related sulfur source changes may primarily control the atmospheric chemistry, and consequently the ice chemistry, in both polar regions. (Auth. mod.)

F-46889

Stein, A.B., **Growth of the Müller Ice Shelf during the later half of the Little Ice Age as documented by glacial marine sediments and radiogeochemistry,** Clinton, Hamilton College, 1992, 56p., B.A. thesis. 19 refs.

From 2 cores collected in Lallemand Fjord, evidence suggests that the Müller Ice Shelf has migrated during the last 600 years over one of the core sites. From approximately 1200 to 1650 AD, eolian sediment deposition and total organic carbon values indicate an open marine environment throughout the fjord as the ice shelf retreated shoreward. Sediment analyses indicate a pronounced progradation of the Müller Ice Shelf through the Little Ice Age to approximately 1860 AD. Eolian debris was deposited in the fjord, facilitated by the extension of the Müller Ice Shelf which transported sediments over the calving line and into the marine environment. Further variation in the sediment record demonstrates another regression of the Müller Ice Shelf after it reached its maximum during the Little Ice Age in 1869 as sediment levels decreased. Up to 1974, continued growth of the shelf has been documented by sediment and visual observations. After this time, the Müller Ice Shelf has continued to disintegrate to its present day location. This paper utilizes sediment grain size, total organic carbon, and Pb-210 analyses in an attempt to support these contentions.

F-46896

Jia, P.Q., Bian, L.G., Lu, L.H., **Review of antarctic sea ice problems: observations,** *Antarctic research (Chinese edition),* Mar. 1992 4(1), p.51-58, In Chinese with English summary. 22 refs.

The history of antarctic sea ice observations is reviewed, with special emphasis on visible and infrared imagery available from the NOAA satellite series since the launch of NOAA 2 in Oct. 1972. A table showing monthly estimates of sea ice cover in the Antarctic in millions of sq km, from different sources, is presented.

F-46904

Nishio, F., **Multi-sensor data set and sea ice study,** International Symposium on Okhotsk Sea and Sea Ice, 7th, Mombetsu, Hokkaido, Japan, Feb. 2-5, 1992. Abstracts, Mombetsu, Okhotsk Sea and Cold Ocean Research Association, 1992, p.272-276, In Japanese with English summary. 6 refs.

Japan's first polar orbiting earth observation satellite series MOS-1 and MOS-1b use three different sensors, which are MESSR (Multi-spectrum Electronic Self-scanning Radiometer), VTIR (Visible Thermal Infrared Radiometer) and MSR (Microwave Scanning Radiometer). The great advantage of the MOS-1 is that it can observe the same phenomena by three different sensors at the same time. In order to contribute to the ISY (International Space Year)/PIE (Polar Ice Extent) Program, the authors have produced MOS-1 multisensor data sets of the Okhotsk Sea and Antarctica, received at Showa Station. This paper describes the uses of the data set for sea ice study and monitoring, and also further plans to produce the MOS-1 data set and other sensors in the arctic region.

F-46939

Jaworowski, Z., Segalstad, T.V., Ono, N., **Do glaciers tell a true atmospheric CO2 story,** *Science of the total environment,* Apr. 1992 Vol.114, p.227-284, Refs. p.276-284.

Until 1985 most studies of CO2 in gas inclusions in pre-industrial ice indicated that CO2 concentrations (up to 2450 ppm) were higher than the current atmospheric level. After 1985, lower pre-industrial CO2 values were reported, and used as evidence for a recent man-made CO2 increase. The errors in these revised values, however, are of a similar magnitude to the apparent increase in atmospheric CO2 level. The assumptions used in estimating lower CO2 values in past atmospheres have been: no liquid phase in polar ice; younger age of air than of ice due to free gas exchange between deep firn and the atmosphere; and no change in composition of air inclusions. These assumptions are shown to be invalid. Liquid saline water exists in ice at low temperatures, even below -70 C; airtight ice layers are ubiquitous in antarctic firn; and more than 20 physico-chemical processes operating *in situ* and in ice cores contribute to the alteration of the chemical composition of air inclusions. The permeable ice sheet with its capillary liquid network acts as a sieve which redistributes elements, isotopes, and micro-particles. To date, glaciological studies are not able to provide a reliable reconstruction of either the CO2 level in pre-industrial and ancient atmospheres or paleoclimates. Instead, these studies have led to a widely accepted false dogma of man-made climatic warming. (Auth. mod.)

F-46953
Moore, J., Narita, H., Maeno, N., **Continuous 770-year record of volcanic activity from East Antarctica,** *Journal of geophysical research,* Sep. 20, 1991 96(D9), p.17,353-17,359, 23 refs.

A 100 m ice core from site G15 on the Mizuho plateau has been analyzed using the dielectric profiling (DEP) technique. The capacitance and conductance of the core were measured at a-c frequencies (20 Hz-300 kHz). The high-frequency conductivity profile shows variations that are primarily related to the strong acids derived from volcanic activity. The Tambora (1815) eruption can be identified with the aid of an approximate chronology based on the firn densification rate; other historic eruptions can then be recognized. Beyond about 300 years, historical observations are very few; however if a constant overall accumulation rate is assumed, a well-known eruption of 1259 A.D. can be found near the bottom of the core. Other peaks in the conductivity profile can than be assigned dates accurate to within a few years. By using the conductivity profile it is possible to estimate the relative acid deposition fluxes produced by the main eruptions with reasonable accuracy. (Auth. mod.)

F-46990
Kotliakov, V.M., **Glaciological zonation and seasonal snow resources throughout the world** [Gliatsiologicheskoe raĭonirovanie i sezonnye snegozapasy zemnogo shara], *Materialy gliatsiologicheskikh issledovaniĭ,* May 1991 Vol.72, p.4-19, In Russian with English summary.

The areas and volumes (in the water equivalent) of seasonal snow cover in 10 sub-latitudinal glaciological zones have been calculated from the maps of snow and ice storage in the World Atlas of Snow and Ice Resources. These zones are united into five glaciological belts, subdivided by submeridional boundaries into 36 glaciological provinces. The area of sea ice and snow cover spreading on it in both the hemispheres is nearly equal, while the areas of inland snow cover differ greatly. The volumes of snow cover on the Southern and Northern Hemispheres as well as the volumes of snow cover on the land and sea ice are close. The volumes of snow storage formed by the moisture of different oceans correlate with the value of corresponding snow-covered areas, where the thickness of snow layer formed by the moisture of different oceans equals 20 cm. 50% of solid precipitation falls outside the limits of the ocean basin—the source of moisture. (Auth. mod.)

F-46991
Loktionova, E.M., **Macroscale characteristics of snow cover distribution throughout the world** [Makromasshtabnye osobennosti raspredeleniia snezhnogo pokrova na zemnom share], *Materialy gliatsiologicheskikh issledovaniĭ,* May 1991 Vol.72, p.20-28, In Russian with English summary.

Changes in the snow cover of the globe are analyzed in this paper. The regularities of the interrelations between these properties in the Northern and Southern Hemispheres have been established. On the basis of the data obtained, it is assumed that the change of circulation epochs in the Northern Hemisphere can be brought about, along with other causes, by the changing areas occupied by seasonal snow cover. The spatial generalization of the regime regularities of snow cover and its distribution over all climatic belts of the Earth was conducted with due regard to the typization of snow cover in mountain systems. (Auth.)

F-46992
Krenke, A.N., Rototaeva, O.V., Chernova, L.P., **Current state of the regime of glacier systems in the world** [Sovremennoe sostoianie rezhima lednikovykh sistem zemli], *Materialy gliatsiologicheskikh issledovaniĭ,* May 1991 Vol.72, p.55-66, In Russian with English summary.

Results of the analysis of spatial changes in mass balance components of glaciers—accumulation and ablation—lead to the conclusion that the main regularities of their regime variations are, first of all, the relationship to geographical latitude; secondly, the distance from the oceans nourishing glaciers with precipitation; and thirdly, the location of glaciers on the windward or leeward sides of mountain systems. The global surface of the chionosphere, the influence of climatic conditions and topography on the extent and spatial structure of glacierization in different latitudinal zones, the contribution of accumulation and ablation conditions to the formation of mass-exchange fields, and the main processes of ice formation, are characterized. The role of glaciers in the moisture-exchange of the planet has been evaluated. Features of time changes of glaciers for the last 400 years, and in particular in the third quarter of the 20th century, are shown. (Auth.)

F-46993
Larina, T.B., **Numerical studies of the temperature, ice age and conditions of a glacier bed using the drilling results from Vostok Station in Antarctica** [Chislennoe izuchenie temperatury, vozrasta l'da i usloviĭ na dne lednika po rezul'tatam bureniia na stantsii Vostok v Antarktide], *Materialy gliatsiologicheskikh issledovaniĭ,* May 1991 Vol.72, p.123-131, In Russian with English summary. 10 refs.

Comprehensive experimental data obtained from the results of deep drilling at Vostok Station were assembled. The measurements conducted in the borehole yielded the temperature profile and age of the ice; the temperature and accumulation on the glacier surface in the area of the station for 165,000 years are known from the results of the isotope analysis. The behavior of the ice sheet surface in the same area and during the same period was estimated from the gas content in the ice. This paper also deals with the problem of vertical ice flow in ice sheets and with conditions on the glacier bed. Computations have been made for different basal conditions: freezing, melting-freezing and the presence of a subglacial lake. The borehole was not drilled on the ice divide, and therefore its results are for evaluation purposes only. If data on the ice divide were available, it would have been possible to make more reliable predictions. (Auth. mod.)

F-46999
Garudachar, R., **Coherent Antarctic Radar Depth Sounder (CARDS) design, development and results,** Lawrence, University of Kansas, 1989, 169p., University Microfilms order No. 90-09888, Ph.D. thesis. Refs. p.136-148.

A modern coherent ice probing radar for probing the ice sheets of Antarctica and Greenland has been designed and developed. It can be operated from a mobile truck or a Twin-Otter aircraft. It was successfully operated on Downstream B, a dynamic glacier in West Antarctica, in the austral summer of 1987-88. The system is an unfocused synthetic-aperture radar (SAR) where the along-track resolution is improved by coherent integration. It has a peak RF power of 20 w, range of 5 km and a range resolution of 5 m in ice. The peak power requirement is reduced by chirp technique; coherent and non-coherent integrations significantly enhance the system signal-to-noise ratio, further reducing the peak power. The system sensitivity including the antennas is -214 dB. The receiver has a dynamic range of more than 100 dB, achieved by a sensitivity time control (STC) circuit. The radar returns can be displayed in the field in near-real-time in a color image mode and also in an A-scope display. (Auth. mod.)

F-47003

MacAyeal, D.R., **Irregular oscillations of the west antarctic ice sheet,** *Nature,* Sep. 3, 1992 359(6390), p.29-32, 26 refs.

Model simulations of the West Antarctic ice sheet suggest that sporadic, perhaps chaotic, collapse (complete mobilization) of the ice sheet occurred throughout the past one million years. The irregular behavior is due to the slow equilibration time of the distribution of basal till, which lubricates ice-sheet motion. This nonlinear response means that predictions of future collapse of the ice sheet in response to global warming must take into account its past history, and in particular whether the present basal till distribution predisposes the ice sheet towards rapid change. (Auth.)

F-47013

Glazovskiĭ, A.F., **Soviet glaciological studies in 1990** [Sovetskie gliatsiologicheskie issledovaniia v 1990 godu], *Materialy gliatsiologicheskikh issledovaniĭ,* May 1991 Vol.72, p.229-240, In Russian.

In 1990, glaciological studies were conducted in the Caucasus, Central Asia, the Khibiny Mountains, Siberia, the Far East and Kamchatka, and in the Arctic and Antarctica. Topics included glaciers, snow cover and avalanches, paleoglaciology, engineering geology, and ice cover. Studies in Antarctica included drilling and ice cores at Vostok Station, dynamics of regional sections of ice cover, nourishment of the ice cover by atmospheric precipitation, the absorption of electrical waves in a glacier at Vostok Station, electrical characteristics of snow-ice formation, radar characteristics of glacier ice, radar photography of glacier thickness near Progress Station, Emery Glacier, and thermal balance of glacier surfaces.

F-47115

Zhao, Z.H.M., **Measurement, analysis, and modeling of deformation of the shelf flow, Byrd Glacier,** Orono, University of Maine, 1990, 108p., University Microfilms order No. 91-12796, Ph.D. thesis. Refs. p.93-98.

Photogrammetric measurement was used in this study to evaluate the velocity and deformation of the shelf flow of Byrd Glacier, with special emphasis on the north rift zone. A non-topographic approach of photogrammetric analysis of the deformation characteristics of the shelf flow was conducted. The photogrammetric measurements also served as verification of the theoretical mechanical model which describes the dynamics of the ice flow. A finite element approach was used to approximate the theoretical model. An experimental approach using this method enabled the modeling results to fit both the theory and the measurements well. This study extended the application of non-topographic photogrammetry in glacier measurement, and more importantly, provided better understanding of the ice dynamics of Byrd Glacier. (Auth. mod.)

F-47131

Eicken, H., **Salinity profiles of antarctic sea ice: field data and model results,** *Journal of geophysical research,* Oct. 15, 1992 97(C10), p.15,545-15,557, 47 refs.

In order to describe and compare sea ice salinity distributions, this paper presents computed composite profiles and fitted third-degree polynomials to salinity data of 129 cores from the Weddell Sea. Four characteristic profile shapes have been recognized and described through the polynomial coefficients. The field data have been compared with "ideal" salinity profiles generated by a simulation scheme based on thermodynamic growth under climatological conditions representative of the Weddell Sea. Composite salinity profiles agree well with simulations, irrespective of the growth mechanism (i.e., frazil or congelation), suggesting that ice properties which depend on salinity or porosity may evolve independent of ice growth conditions. Analysis of salinity and (delta)O-18 data in conjunction with the simulations demonstrates that apart from meteorological conditions controlling growth rate and temperature distribution within the ice, flooding and upward brine expulsion are important in raising top salinities as frequently observed. Low top salinities are typical of ice that has undergone retexturing and differential desalination. Salinity decreases towards the bottom of a floe are a result of high oceanic heat fluxes and snow-cover effects. As a consequence of these processes the bulk salinity of Weddell Sea ice cannot be described by a simple linear age-thickness relationship as can arctic first-year ice. (Auth. mod.)

F-47132

Massom, R.A., **Observing the advection of sea ice in the Weddell Sea using buoy and satellite passive microwave data,** *Journal of geophysical research,* Oct. 15, 1992 97(C10), p.15,559-15,572, 52 refs.

This study examines the progress and behavior of sea ice during the growth season of 1980 as it drifts from the southwestern Weddell Sea, by using data from four buoys tracked by Nimbus 6 and concurrent ice concentrations retrieved from Nimbus 7 scanning multichannel microwave radiometer data. The overall drift characteristics, and their relationship to ice edge displacement, are examined within the framework of four zones. Three phases are identified in the large-scale behavior of the Weddell sea ice cover, namely, a rapid equatorward and eastward advance, a quasi- equilibrium phase, and a period of rapid recession. A broad division is made between the sectors to the east and west of 35-40W in terms of the nature of ice edge advance. Transient departures from the mean northward advection are linked to the passage of cyclones, which may be significant in terms of the formation and maintenance of the region of highly consolidated perennial ice observed in the western Weddell Sea. Mean daily drift rates from within the central-western Weddell pack were high in 1980, particularly early in the growth season and when compared with rates to the west of 50W. Closed loops in the buoy trajectories, which are clockwise to the south of 63S, reverse to become anticlockwise to the north. Mid-ocean islands impede the eastward progress of the ice. A coherence is noted in the response of the buoys to the passage of storms, even though the buoys were separated by over 100 km. (Auth. mod.)

F-47180

Gow, A.J., Tucker, W.B., **Physical and dynamic properties of sea ice in the polar oceans,** *U.S. Army Cold Regions Research and Engineering Laboratory. Monograph,* M 91-01, Sep. 1991 46p., ADA-256 303, Refs. p.42-46.

This monograph provides a current review of the state of knowledge of the growth, properties, and small- and large-scale behavior of sea ice found in the polar oceans of the northern and southern hemispheres. A major focus of the report is to contrast and compare the physical and dynamic properties of ice found in the Arctic seas with those found in the seas surrounding the antarctic continent. Very significant differences in the physical and dynamic properties of the ice are shown to exist that derive directly from differences in land-sea relationships between the two polar regions and their effect on ocean-atmosphere interaction and oceanic circulation. The same factors also determine, to a large degree, major differences in the seasonal distribution and extent of sea ice in the arctic and antarctic oceans. (Auth.)

F-47199

Hosseinmostafa, R., Lytle, V.I., **Comparison of radar backscatter from antarctic and arctic sea ice,** International Geoscience and Remote Sensing Symposium, 12th, Houston, TX, May 26-29, 1992. IGARSS '92. International space year: space remote sensing. Vol.2, New York, Institute of Electrical and Electronics Engineers, 1992, p.1533-1535, 6 refs.

Two ship-based step-frequency radars, one at C band (5.3 GHz) and one at Ku band (13.9 GHz), measured backscatter from ice in the Weddell Sea in 1989 from the research vessel F.S. *Polarstern*. Most of the backscatter data were from first-year (FY) and second-year (SY) ice at the ice stations where the ship was stationary, and detailed snow and ice characterizations were performed. The presence of a slush layer at the snow-ice interface masks the distinction between FY and SY ice in the Weddell Sea, whereas in the Arctic the separation is quite distinct. The effect of snow-covered ice on backscattering coefficients from the Weddell Sea region indicates that surface scattering is the dominant factor. Measured backscattering coefficient values were compared with Kirchhoff and regression-analysis models. Finally, the Weibull power-density function was used to fit the measured backscattering coefficients at 45 deg. (Auth.)

F-47213

Kovacs, A., **Glacier, river and sea ice blister observations,** *U.S. Army Cold Regions Research and Engineering Laboratory. Special report,* SR 92-22, Aug. 1992 14p., ADA-256 301, 35 refs.

Ice blister observations made by the author in Greenland, Alaska and Antarctica are discussed. Ice blisters up to 3 m high and tens of meters long were observed on rivers and glaciers as well as on a subsurface glacial pool. Ice blisters observed by other investigators are also discussed, as is ice blister morphology (solid, hollow or water-filled), the processes associated with their formation and their potential as a resource for potable water. (Auth.)

F-47222

Delmas, R.J., **Environmental information from ice cores,** *Reviews of geophysics,* Feb. 1992 30(1), p.1-21, Refs. p.19-21.

Information recorded in polar ice cores over the last several hundred millennia is invaluable to studies aimed at understanding the preindustrial environmental system and anticipating the future evolution of the atmosphere. An excellent understanding of the mechanisms of the ice record formation as well as a good assessment of the present polar atmospheric composition (trace gases, aerosol) are prerequisites to interpreting correctly the past variations of the measured parameters. This paper explains what and how atmospheric parameters are recorded. Ambient air samples are encapsulated and stored in the ice bubbled by relatively simple processes. The isotopic composition of the H2O (ice) lattice is a reliable paleothermometer. The data obtained from deep ice cores provide precise information on the ice age environmental conditions. When polar temperatures were some 10 C lower than now, atmospheric CO2 and CH4 contents were factors of 2 and 4 lower, respectively, than at present. (Auth. mod.)

F-47227

Eraso, A., Antiguedad, I., **Record of the 1988-1989 expedition at the Spanish Juan Carlos I Station** [Memoria de la Campaña 1988/1989 en la Base Antártica Española Juan Carlos I], Spain. Proyecto Español de Glaciología Antártica. Contribución a la Campaña Antártica 88/89. Primeros resultados. (Contribution to the Antarctic Expedition 1988-1989. First results), [Madrid], E.T.S.I. Minas: Universidad Politecnica de Madrid, [1989], p.3-22, In Spanish.

DLC GB2597.C86

Glaciological and hydrological field activities carried out on the Cazadora Glacier, which covers the Hurd Peninsula on which the Juan Carlos I Station is located and which is part of Livingston I., are summarized. The activities consisted mainly in the collection of ice samples for future isotope analysis, and ice measurements at 205 stations, over an area of 15 sq km, to determine the rate of subglacial drainage in the area. Difficulties encountered during the investigations described are outlined. Some recommendations for overcoming those difficulties in future studies on the Glacier are presented.

F-47228

Antiguedad, I., Eraso, A., Fernandez Rubio, R., **Correlation between discharge and hydrochemical parameters in the river at Juan Carlos I Station** [Correlación entre caudales drenados y parametros hidroquímicos en el río de la Base antártica Española Juan Carlos I (Isla Livingston, Shetland del Sur)], Spain. Proyecto Español de Glaciología Antártica. Contribución a la Campaña Antártica 88/89. Primeros resultados. (Contribution to the Antarctic Expedition 1988-1989. First results), [Madrid], E.T.S.I. Minas: Universidad Politecnica de Madrid, [1989], p.24-31, In Spanish with English summary. 3 refs.

DLC GB2597.C86

Using the data series available and the observations carried out in Feb. 1989 on the river near Juan Carlos I Station, the authors quantify the cryochemical effect defined by the inverse relationship between conductivity and discharge. These characteristics had been observed before, in the Arctic. On the basis of the hydrochemical data, the hydrogram is decomposed by identifying the provenance of the flows. (Auth. mod.)

F-47229

Antiguedad, I., Eraso, A., Mangin, A., Fernandez Rubio, R., **Hydrogram characteristics as a function of meteorological data and elaboration of the discharge curve of the river at Juan Carlos I Station** [Características del hidrograma en función de los datos meteorológicos y elaboración de la curva de gastos del río de la Base Antártica Española (Isla Livingston, Shetland del Sur)], Spain. Proyecto Español de Glaciología Antártica. Contribución a la Campaña Antártica 88/89. Primeros resultados. (Contribution to the Antarctic Expedition 1988-1989. First results), [Madrid], E.T.S.I. Minas: Universidad Politecnica de Madrid, [1989], p.32-40, In Spanish with English summary. 1 ref.

DLC GB2597.C86

The hydrogram characteristics of the river near Juan Carlos I Station, which drains the Cazadora Glacier, are analyzed. These data were obtained from a limnigraph operating in Feb. 1989, and by establishing the discharge curve calculated by watermill daily measurements. The hydrogram shapes are interpreted and the cause-effect relationship is determined between the glacier discharge and meteorological variables such as atmospheric temperature and pressure, precipitation, humidity, and solar radiation. Correlation and spectral analysis enable the authors to fix this relationship. (Auth. mod.)

F-47230

Antiguedad, I., Eraso, A., Fernandez Rubio, R., **Different water types found in the vicinity of Juan Carlos I Station** [Diferentes tipologías de aguas encontradas en la proximidad de la Base Antártica Española (Isla Livingston, Shetland del Sur)], Spain. Proyecto Español de Glaciología Antártica. Contribución a la Campaña Antártica 88/89. Primeros resultados. (Contribution to the Antarctic Expedition 1988-1989. First results), [Madrid], E.T.S.I. Minas: Universidad Politecnica de Madrid, [1989], p.41-49, In Spanish with English summary. 4 refs.

DLC GB2597.C86

Variations of some physico-chemical parameters (conductivity, pH, temperature) are studied in a net of 15 water points of different origin (snowpath, permafrost, subsurface drainage, subglacial drainage) which were systematically analyzed, often on a daily basis. Spatial and temporal variations of these parameters, and complementary chemical analyses, allowed the authors to determine the different water families existing close to the Juan Carlos I Station. (Auth. mod.)

F-47231

Eraso, A., **Vertical distribution of stable isotopes in the Cazadora Glacier near Juan Carlos I Station** [Distribución vertical de isotopos estables (deuterio y oxigeno-18) en el hielo del glaciar Cazadora junto a la Base Antártica Española Juan Carlos I, isla Livingston (Shetland del Sur)], Spain. Proyecto Español de Glaciología Antártica. Contribución a la Campaña Antártica 88/89. Primeros resultados. (Contribution to the Antarctic Expedition 1988-1989. First results), [Madrid], E.T.S.I. Minas: Universidad Politecnica de Madrid, [1989], p.50-60, In Spanish with English summary. 1 ref.

DLC GB2597.C86

The vertical distribution of oxygen 18 and deuterium is analyzed in 22 core barrel samples obtained from a 17.5 m thick sequence of ice located at the border of Cazadora Glacier near Juan Carlos I Station. Paleotemperatures and paleoclimate are determined by studying the concentration variations of both components. The results are similar to those obtained from data on the Argentine Is. in the files of the International Atomic Agency in Vienna. (Auth. mod.)

F-47232

Eraso, A., **Vertical distribution of some oligo-elements in the Cazadora Glacier near the Juan Carlos I Station** [Distribución vertical de algunos oligoelementos presentes en el Glaciar Cazadora junto a la Base Antártica Española Juan Carlos I. Isla Livingston (Shetland del Sur)], Spain. Proyecto Español de Glaciología Antártica. Contribución a la Campaña Antártica 88/89. Primeros resultados. (Contribution to the Antarctic Expedition 1988-1989. First results), [Madrid], E.T.S.I. Minas: Universidad Politecnica de Madrid, [1989], p.61-70, In Spanish with English summary. 5 refs.

DLC GB2597.C86

The vertical distribution of 24 oligo-elements was determined in 22 ice samples from a 17.5 m thick sequence obtained at the border of Cazadora Glacier near the Juan Carlos I Station. The authors studied both the influence of the proximity of the marine environment, with its contribution of aerosols, and the intercalation of volcanic ash among the ice layers, which alteration could release some oligo-elements into the ice. (Auth. mod.)

F-47233

Eraso, A., Antiguedad, I., Taylor de Lima, M., **Structural analysis of the Cazadora Glacier ice, directional anisotropy quantification and subglacial drainage prediction** [Analisis estructural del hielo del Glaciar Cazadora, cuantificación direccional de la anisotropía y predicción del drenaje subglaciar. Base Antártica Española Juan Carlos I, isla Livingston (Shetland del Sur)], Spain. Proyecto Español de Glaciología Antártica. Contribución a la Campaña Antártica 88/89. Primeros resultados. (Contribution to the Antarctic Expedition 1988-1989. First results), [Madrid], E.T.S.I. Minas: Universidad Politecnica de Madrid, [1989], p.71-79, In Spanish with English summary. 13 refs.

DLC GB2597.C86

The authors quantify, by ice-deformation analysis, the directional anisotropy of the glacier tongues Gaucho, Negro and Johnson of the Cazadora Glacier. The results, obtained by compared and global analysis, are used in the Direction Prediction Method of underground drainage to establish quantitatively the probability degree of each direction mode found. The end purpose of the study is to predict the subglacial drainage and provide a source of drinking water to nearby settlements. (Auth. mod.)

F-47248

Suttie, E.D., Wolff, E.W., **Seasonal input of heavy metals to antarctic snow,** *Tellus,* Sep. 1992 44B(4), p.351-357, 21 refs.

Cadmium, copper, lead and zinc concentrations have been measured on a sequence of snow blocks covering 2 years' accumulation at a site on the east coast of the Antarctic Peninsula. Careful collection and analysis techniques have ensured good data quality despite the very low concentrations, which averaged Cd 0.08 ng/kg, Cu 4 ng/kg, Pb 4 ng/kg, Zn 0.4 ng/kg. The elements show significant variations through the year. Pb has peaks in the autumn/winter period when both the crustal and marine aerosol are also at their maxima; despite a probable pollutant origin, Pb appears to be associated with natural aerosol in long range transport. No clear seasonal signal is observed for the other metals. At this site, the marine contribution to the concentrations of some metals may be significant. (Auth.)

F-47292

Zachos, J.C., Breza, J.R., Wise, S.W., Jr., **Early Oligocene ice-sheet expansion on Antarctica: stable isotope and sedimentological evidence from Kerguelen Plateau, southern Indian Ocean,** *Geology,* June 1992 20(6), p.569-573, 34 refs.

Sedimentological and stable isotope data from a pelagic sequence recovered from the southern Indian Ocean provide the most convincing evidence to date for short-term expansion of a large ice sheet on Antarctica during the earliest Oligocene (about 36 Ma). Terrigenous debris identified as ice-rafted in origin on the basis of textural, compositional, and size criteria is present at the same stratigraphic level as the ubiquitous early Oligocene oxygen isotope shift. The highest benthic foraminiferal *delta*O-18 values (>3.0 per mill) of the Paleogene occur in samples from within the ice-rafted debris interval. These values are similar to those recorded by Holocene benthic foraminifera, implying that the ice sheet may have attained a volume similar to that of the present-day ice sheet on Antarctica. The stratigraphic distribution of ice-rafted debris and high oxygen isotope values indicate that these conditions persisted for roughly 100 ka. (Auth.)

F-47297

Andreas, E.L., Claffey, K.J., **Air-ice drag coefficient in the Weddell Sea deduced from profile measurements,** MP 3154, Symposium on Turbulence and Diffusion, 10th, Portland, OR, Sep. 29-Oct. 2, 1992, Boston, American Meteorological Society, 1992, p.J5/109-J5/112, 12 refs.

The air-ice drag coefficient provides a convenient way to estimate the surface stress on sea ice from a measurement of the average wind speed at some reference height, in this case at 10 meters, multiplied by the root-mean-square sea ice surface roughness in centimeters. Air-ice drag coefficients were determined from wind speed profiles collected on Ice Station Weddell 1 which drifted through the western Weddell Sea on a multiyear ice floe from February to June 1992. The drag coefficients at 10 m ranged from .0013 to .0025 with an average of .0019. However, calculating the surface stress on an ice floe from the surface roughness and average drag coefficient value is an oversimplification because a 10 degree shift in wind direction may change the surface stress by a factor of two.

F-47304

Sugden, D., **Antarctic ice sheets at risk?,** *Nature,* Oct. 29, 1992 29(6398), p.775-776, 8 refs.

Two opposing views are presented as possible consequences of global warming. Tending toward the instability of the antarctic ice sheet is the interpretation of deposits by deglaciation of leaves and pollen of the southern beech and marine diatoms, thought to have existed only in the Pliocene, in the Sirius Group of the Transantarctic Mountains. A recent observation of dating volcanic ash in a borehole in the Dry Valleys confirms an earlier dating and leads to a rendering of an Antarctica having several open seaways and basins during the Pliocene. Tending toward the stability of the ice sheet is other evidence. Recently (Sep/Oct 1992) presented laser fusion measurements of volcanic ash found in the Dry Valleys indicate the great age of the landscape. Ash falls up to 14 million years old are trapped in frost wedges. This close association of ash with cold desert conditions is explained by an unbroken line of cold desert features without water activity. Glacial landforms show the same pattern: there is no evidence of meltwater activity. Sea cores show no evidence of changes that would have accompanied a Pliocene collapse of the ice sheet. Ice sheets in cold, dry environments increase in size rather than decrease because a 5 C rise in temperature is sufficient to produce more snow but insufficient to melt the ice. An increase of 20-25 C would be necessary to remove the interior ice sheet.

F-47310

Moser, H., Stichler, W., Graf, W., Reinwarth, O., **Investigations of accumulation on the Filchner/Ronne Ice Shelf (Antarctica) using isotopic stratigraphy** [Untersuchungen zur Akkumulation auf dem Filchner/Ronne-Schelfeis (Antarktis) unter Anwendung von Isotopenmethoden], *Freiberger Forschungshefte. C,* 1990 Vol.442, Isotope und ihre Anwendung in den Geowissenschaften, in der Bergbausicherheit und im Umweltschutz: Vortrage des 4. Internationalen Isotopenkolloquiums 1988 in Freiberg, p.57-71, In German with English summary. 15 refs.

DLC QE1.F73 Vol.442

The accumulation rates in the eastern part of the Ronne Ice Shelf as determined by isotopic stratigraphy (O-18) decrease from 21.3 at Filchner Station to 13.3 g/sq cm/a at measuring point 341, located 270 km up-stream of the ice edge. The O-18 content of the near-surface layers decreases in the same area from -25 to -29 per mill due to the isotopic continental effect. The O-18 profile of a 100 m ice core drilled in 1984 at point 340, 220 km from the ice edge, reveals 520 annual layers. The deduced accumulation rates in the catchment area of the ice core, using a simple ice- flow model, show variations which can be interpreted as variations of past accumulation rates. (Auth.)

F-47316

Yamanouchi, T., **Preliminary report on the observation of polar atmosphere and cryosphere by MOS-1 data received at Syowa Station,** Proceedings on MOS-1 data evaluation. Edited by K. Maeda and S. Ogawa, Tokyo, National Space Development Agency of Japan (NASDA), Earth Observation Center, 1990, p.175-188, N92-23481, In Japanese with English summary. 12 refs.

The multipurpose satellite data receiving system (11 m antenna) has received data from the Marine Observation Satellite-1 (MOS-1) since Feb. 1989. The MOS-1 data have enabled the analysis of cloud liquid water content and water vapor amount, derivation of sea ice information and concentration, and monitoring of the ice sheet edge. Using images from the MOS-1 processed data, applicability of the data to the research subject is examined. Multispectral Electronic Self Scanning Radiometer (MESSR) imagery is applicable to the monitoring of the ice sheet edge. The Visible and Thermal Infrared Radiometer (VTIR) supplies important data to observe synoptic and large scale meteorology. However, the detection of clouds over snow and ice surfaces is difficult, especially in polar night. One of the main uses for the Microwave Scanning Radiometer (MSR) data is to survey the condition and distribution of the sea ice. However, the data are affected by the atmospheric liquid water and water vapor, and may result in large estimation errors of the sea ice concentration. It is difficult to derive the liquid water and water vapor concentration from these data over snow or ice covered surfaces. (Auth.)

F-47327

Adamson, D.A., Colhoun, E.A., **Late Quaternary glaciation and deglaciation of the Bunger Hills, Antarctica,** *Antarctic science,* Dec. 1992 4(4), p.435-446, Refs. p.445-446.

The Bunger Hills were covered by the Antarctic Ice Sheet during the last glaciation. During deglaciation the ice sheet margin collapsed into the marine inlets and the sea entered the oasis before 7.7 ka BP. Raised beaches occur widely below 8.5 m and indicate uplift at 1.4 m/ka during the Middle and Late Holocene. After the coastal inlets were formed, the Edisto Ice Tongue and Apfels Glacier still impinged on land margins in the west of the oasis. Two sets of marginal moraines were formed: the Older Edisto Moraines after 6.2 ka BP and the Younger Edisto Moraines during the last few centuries. The margins of the Antarctic Ice Sheet and Apfels Glacier in the south have maintained their present positions since at least 5.6 ka BP and probably 10 ka BP. (Auth.)

F-47332

King, E.C., Jarvis, E.P., **Short-offset seismic refraction results near Rothera Station, Antarctic Peninsula,** *Antarctic science,* Dec. 1992 4(4), p.479-480, 3 refs.

Details are presented of seismic velocities at a site near Rothera Point, Adelaide I. The snow/firn velocity structure was obtained using a 24-channel Bison 9000 seismograph, recording the outputs of geophones of 40 Hz natural frequency attached to 150 mm snow spikes. The refraction velocity of the underlying bedrock was measured using a 48-channel DFS V recorder and 10 Hz geophones. The records were obtained during trials of equipment and techniques which took place in the 1988-89 and 1990-91 seasons. The data will be of interest to other investigators studying firn structure around Antarctica, or considering crustal seismology in the Antarctic Peninsula region.

F-47340

Hannuki, T., Ishizawa, K., Futami, K., Tsukui, K., **Laboratory test on construction of ice domes and their load-carrying capacity,** *Antarctic record,* July 1992 36(2), p.203-226, In Japanese with English summary. 18 refs.

Ice domes will be used as a shelter of depot and laboratory space without heating systems which will be constructed on the ice field in the Arctic or Antarctica. Experiments on construction technique of ice domes and their load-carrying capacity were carried out in a low-temperature laboratory. It was confirmed that ice domes could be made by spraying water on a spherically inflated membrane form under the condition of holding a temperature below -18 C. The mechanical properties of artificial ice made in the laboratory are examined by bending tests of simply supported ice beams so as to obtain a constitutive model of ice for numerical analysis. Load-carrying capacity and creep behavior of ice dome models were examined in the laboratory, and analytical models of ice structure for a numerical procedure of the design are discussed and compared with the tests. The suitability of an elastic-plastic model for the mechanical behavior of ice structures in a short term loading, and that of a Maxwell model for the long-term creep of ice structure, was confirmed. (Auth. mod.)

F-47343

Hondoh, T., **Crystallographic analyses of clathrate hydrates included in Vostok ice cores,** *Antarctic record,* July 1992 36(2), p.268-278, In Japanese with English summary. 6 refs.

The purpose and methods of crystallographic analyses of clathrate hydrates included in ice cores recovered at Vostok are briefly reviewed. The clathrate hydrate is a crystal composed of a cage structure formed by water molecules, and includes individual air molecules in the molecular cages. The crystallographic structure is described of the clathrate hydrate crystals found in deep ice cores determined by X-ray diffraction and Raman scattering measurements, and the formation process of the crystals in the ice sheet is discussed. Also discussed as a future prospect in core analysis is what new information and knowledge relating to climatic changes can be deduced from crystallographic analysis of the clathrate hydrates. (Auth.)

F-47348

Beaudoin, B.C., Ten Brink, U.S., Stern, T.A., **Characteristics and processing of seismic data collected on thick, floating ice: results from the Ross Ice Shelf, Antarctica,** *Geophysics,* Oct. 1992 57(10), p.1359-1372, 39 refs.

Coincident reflection and refraction data, collected in the austral summer of 1988/89, imaged the crust beneath the Ross Ice Shelf, Antarctica, which is a unique acquisition environment for seismic reflection profiling because of its thick floating ice cover. The ice shelf velocity structure is multilayered with a high velocity-gradient firn layer constituting the upper 50 to 100 m. This near surface firn layer influences the data character by amplifying and frequency modulating the incoming wavefield. In addition, the ice-water column introduces pervasive high energy seafloor, intra-ice, and intra-water multiples that have moveout velocities similar to the expected subseafloor primary velocities. Successful removal of these high energy multiples which relies on predictive deconvolution, inverse velocity stack filtering, and frequency filtering, reveals a faulted, sedimentary wedge which is truncated at or near the seafloor. Beneath this wedge the reflection character is diffractive to a two-way travel time of approx. 7.2 s. At this time, a prominent reflection is evident on the southeast end of the reflection profile. This reflection is interpreted as Moho, indicating that the crust is approx. 21 km thick beneath the profile. These results provide seismic evidence that the extensional features observed in the Ross Sea region of the Ross Embayment extend beneath the Ross Ice Shelf. (Auth. mod.)

F-47349

Sowers, T., Bender, M., Raynaud, D., Korotkevich, IU.S., ***Delta*N-15 of N2 in air trapped in polar ice: a tracer of gas transport in the firn and a possible constraint on ice age-gas age differences,** *Journal of geophysical research,* Oct. 20, 1992 97(D14), p.15,683-15,697, 39 refs.

In this paper data are presented on the *delta*N-15 of N2 in recently trapped air samples from 12 ice cores, along with numerous downcore samples from Byrd, Vostok, and Dome C. Bubble close-off depths for these cores (calculated from a densification model) ranged from 51 to 114 m below the surface. These data and the barometric equation are used to calculate the thickness of the diffusive air column, and it is found that it comprised 46 to 93% of the total film thickness at the study sites. Paleo-close-off depths calculated from the densification model for glacial sections of Byrd, Vostok, and Dome C are 15-25 m deeper than close-off depths today. Diffusive column heights, calculated from *delta*N-15, varied in a more complex manner. The diffusive column height at Byrd appears to have decreased from 74 m during the last glacial period to 50 m during the Holocene. At Vostok and Dome C the diffusive column height calculated from N-15 increased from about 65 m during the last glacial period to about 80 m in the Holocene. Records of surface temperature and CO2 at Byrd and Vostok, along with their respective chronologies, are used to constrain the ice age-gas age difference throughout the section of the Vostok ice core corresponding to the last glacial termination. In principle, ice age-gas age difference values calculated from these data can be used to discriminate whether gas in the firn mixes to the bubble close-off depth or to a depth equivalent to the diffusive column height. In practice, however, uncertainties in the chronology of Byrd and Vostok are too great to allow distinction between these two possibilities. One can only say that at the time of the last termination, ice age-gas difference for Vostok was between 3 and 10.5 kyr. Previous estimates fall within this range. (Auth. mod.)

F-47356

Li, F., Koci, B., Kelley, J., **Study of ice borehole closure by finite element method,** International Conference on Ice Technology, 3rd, Cambridge, MA, Aug. 11-13, 1992. Proceedings. Edited by T.K.S. Murthy, W.M. Sackinger and P. Wadhams, Southampton, England, Computational Mechanics Publications, 1992, p.77-89, 10 refs.

Ice borehole closure may affect an ice drilling operation when the closure rate reaches some critical level. It is essential to estimate the closure rate of ice boreholes for ice drilling program planning. To estimate ice borehole closure under complex ice and boundary conditions, a finite element model was developed. The ice in this study was treated as a nonlinear, visco-incompressible fluid. Glen's ice flow power law was employed. A direct iteration method was used. Verification studies using Nye's formula show that the model gives accurate results in closure rate, strain rate and stresses with errors at the 4th digit in strain rate. Tests with field measurements from Byrd Station and Dye 3 (Greenland) show that the power law exponent should be considered as a variable of ice effective stresses to get more accurate results. An empirical relation between the exponent and effective stress was obtained with field measurements. Nye's formula is effective under ordinary ice conditions. (Auth. mod.)

F-47357

Lindner, B.L., McKay, C.P., Clow, G.D., Wharton, R.A., Jr., **Computational modeling of antarctic lake ice,** International Conference on Ice Technology, 3rd, Cambridge, MA, Aug. 11-13, 1992. Proceedings. Edited by T.K.S. Murthy, W.M. Sackinger and P. Wadhams, Southampton, England, Computational Mechanics Publications, 1992, p.105-116, 31 refs.

Ice thickness is measured at 6 perennially-frozen freshwater lakes in the dry valleys of Antarctica. A steady thinning of the ice has occurred over the last 15 years, by as much as a factor of 2. Is this thinning related to climatic changes in CO2, O3 or cloud abundance? A computer model of atmospheric radiative transfer was constructed and will be coupled with a computer model of lake ice physics to study the ice-atmosphere link. (Auth.)

F-47363

Jacobs, S.S., **Is the antarctic ice sheet growing,** *Nature,* Nov. 5, 1992 360(6399), p.29-33, 58 refs.

A common public perception is that global warming will accelerate the melting of polar ice sheets, causing sea level to rise. A common scientific position is that the volume of grounded antarctic ice is slowly growing, and will damp future sea-level rise. At present, studies supporting recent shrinkage or growth depend on limited measurements that are subject to high temporal and regional variability, and it is too early to say how the antarctic ice sheet will behave in a warmer world. (Auth.)

See also:
A-46171 A-46842 A-47366 B-45079 B-45173 B-45174 B-45176 B-45344 B-45539 B-45842 B-45861 B-45893 B-45894 B-45897 B-45898 B-45900 B-45929 B-45940 B-45941 B-45942 B-45943 B-45944 B-46168 B-46228 B-46229 B-46234 B-46264 B-46266 B-46269 B-46302 B-46413 B-46704 B-46707 B-46708 B-46710 B-46757 B-46770 B-46805 B-46820 B-46841 B-46887 B-47141 C-45078 C-45197 C-45705 C-45799 D-46057 D-46763 E-45089 E-45097 E-45106 E-45223 E-45259 E-45269 E-45312 E-45321 E-45403 E-45461 E-45548 E-45550 E-45551 E-45702 E-45703 E-45704 E-45768 E-45793 E-45794 E-45903 E-45904 E-45905 E-46034 E-46038 E-46082 E-46157 E-46202 E-46353 E-46371 E-46440 E-46450 E-46483 E-46485 E-46641 E-46687 E-46744 E-46811 E-47234 E-47305 E-47351 E-47354 G-45231 G-45385 G-45964 G-45965 G-45970 G-45971 G-46140 G-46142 G-46500 G-46672 G-46673 G-46775 G-46898 G-47355 I-45125 I-45131 I-45232 I-45251 I-45472 I-45476 I-45560 I-45562 I-45565 I-45567 I-45615 I-45616 I-45637 I-45672 I-45673 I-45691 I-45808 I-45866 I-45875 I-45932 I-45980 I-45992 I-45993 I-46064 I-46066 I-46087 I-46108 I-46110 I-46136 I-46207 I-46430 I-46431 I-46433 I-46436 I-46459 I-46545 I-46546 I-46554 I-46557 I-46565 I-46581 I-46582 I-46595 I-46623 I-46625 I-46711 I-46746 I-46771 I-46875 I-46924 I-46926 I-46927 I-46928 I-47018 I-47047 I-47225 I-47243 I-47247 I-47250 I-47254 I-47311 I-47364 J-45075 J-45154 J-45226 J-45365 J-45373 J-45509 J-45568 J-45599 J-45688 J-45716 J-45895 J-45946 J-45947 J-45991 J-46001 J-46002 J-46071 J-46144 J-46147 J-46153 J-46156 J-46163 J-46221 J-46286 J-46303 J-46804 J-47057 J-47306 K-47201 L-46343

G. LOGISTICS, EQUIPMENT & SUPPLIES

G-45231
Peresypkin, V.I., ed, **Systems and means of marine radio communication; collection of scientific papers** [Sistemy i sredstva morskoĭ radiosviazi; sbornik nauchnykh trudov], Moscow, Transport, 1990, 151p., In Russian. For selected papers see 46-1537 through 46-1540 or G-45233, G-45234 and I-45232.

Results of modeling and evaluations of the effectiveness of the systems and technical means of maritime radio communication, as well as the transmission of information about accidents at sea, are presented in this collection of papers. Data on the characteristics of radio channels, display methods, and radio signal processing are also given. Specific topics in this collection include the gathering of hydrometeorological data in the Soviet Antarctic Expedition, managing information exchange in Antarctica, and the International Maritime Satellite Communications System at coastal antarctic research stations.

G-45233
Safronov, V.A., Kharnovetskiĭ, F.V., **Managing the exchange of facsimile information in Antarctica** [Organizatsiia obmena faksimil'noĭ informatsieĭ v Antarktide], Sistemy i sredstva morskoĭ radiosviazi; sbornik nauchnykh trudov (Systems and means of marine radio communication; collection of scientific papers). Edited by V.I. Peresypkin, Moscow, Transport, 1990, p.52-56, In Russian.

The authors examine problems in managing the transmission of hydrometeorological information from Antarctica over satellite communications channels using the numerical facsimile group 3 for the purpose of developing a system of scientific-operational security in navigation and scientific investigations in the southern ocean. The organization of the facsimile communications and characteristics of the equipment are described. (Auth. mod.)

G-45234
Zharnovetskiĭ, F.V., **Experiment in installing a ship earth station for the INMARSAT satellite communications system in Antarctica** [Opyt ustanovki sudovykh stantsiĭ sputnikovoĭ sviazi sistemy INMARSAT v Antarktide], Sistemy i sredstva morskoĭ radiosviazi; sbornik nauchnykh trudov (Systems and means of marine radio communication; collection of scientific papers). Edited by V.I. Peresypkin, Moscow, Transport, 1990, p.142-144, In Russian. 4 refs.

An experiment in installing user's equipment for the International Maritime Satellite Communications System, INMARSAT (ship earth station satellite link "Standard-A") for non-standard conditions—at coastal antarctic scientific research stations—is described. Specific recommendations are made. (Auth. mod.)

G-45283
Preiser, W.F.E., **Environmental design cybernetics: a relativistic conceptual framework for the design of space stations and settlements,** From Antarctica to outer space: life in isolation and confinement, edited by A.A. Harrison, Y.A. Clearwater and C.P. McKay, New York, Springer-Verlag, [1990], p.147-160, 19 refs.
DLC Q180.55.P75F76

Beginning with the definition of cybernetics as the science of effective organization, and applying it to the design of isolated and confined settlements, the article deals with philosophical issues, a conceptual framework, and environmental design parameters. From the cyberneticist's point of view, environmental design is an iterative process involving sequential planning, programming, design, construction and evaluation. A table showing effects of space on human behavior, in seven spatial and behavioral concepts, is presented.

G-45375
Markwitz, W., Gredel, J., Reiniger, K., **Concept for processing and dissemination of ERS-1 SAR data to be acquired by a German station in Antarctica,** *GeoJournal,* May 1991 24(1), p.119-124, 11 refs.

This paper presents technical data describing a receiving station planned for deployment in Antarctica by the Federal Republic of Germany. The main purpose of the station is the processing of synthetic aperture radar data to be received from the first European Remote Sensing Satellite (ERS-1) in order to enhance research devoted to the Weddell Sea. Included in the paper are data acquisition and processing schemes, including a functional block diagram of the station; a compilation of the ERS-1 product specifications; and a delineation of plans for dissemination of the acquired data.

G-45385
Barthelemy, J.L., **VISICE computer model: mathematical correlations between temperature, stress, and deflection,** International Symposium on Cold Regions Heat Transfer, 3rd, Fairbanks, AK, June 11-14, 1991. Proceedings. Edited by J.P. Zarling and S.L. Faussett, Fairbanks, University of Alaska, 1991, p.281-291, 5 refs.

The finite-element computer program VISICE predicts both the elastic and linear visco-elastic responses of a floating sea-ice sheet to loads applied at the surface. Output data in the form of stress and deflection are used to develop landing and parking curves for aircraft operating at McMurdo Station. As ambient temperature conditions change, however, the transfer of heat to or from a loaded ice sheet may have a significant effect on its load-bearing capacity. Some useful mathematical correlations are developed between input variables and modeled output response. These similarity relationships are helpful in developing nomographs that illustrate required ice thickness for landing and parking in terms of gross aircraft weight, surface temperature and wheel configuration. (Auth.)

G-45399
Krzyszowska, A., **Content of fuel oil in soil and effect of sewage on water nearby the H. Arctowski Polish antarctic station (King George Island),** *Polskie archiwum hydrobiologii,* 1990 (Publ. May 91) 37(3), p.313-326, With Polish summary. 36 refs.

The present studies were designed to evaluate the degree of environmental pollution near the Arctowski Polish Antarctic Station, King George I. in the summer of 1988. Pollution in the vicinity of the Station was due to spills of petroleum-derived fuel into the ground and to domestic sewage. Fuel oil spills cause pollution of a 2400 sq m area, accounting for 1.5% of the area utilized by the Station. Domestic sewage pollution is of a local nature; namely, whereas phosphate content is elevated in water nearby the power station, hydrobiological laboratory and dwelling buildings, it decreases with distance from the pollution sources. (Auth.)

G-45451
Lin, Y.F., Jia, C.Q., **Establishment of China's antarctic seismological and geomagnetic laboratories,** *Acta seismologica sinica,* May 1990 3(2), p.248-255, 2 refs.

China has established seismological and geomagnetic observatories at Great Wall Station on King George I. to make continuous records of earthquake and volcanic activities in the region. These in turn can be correlated with similar activities in China and throughout the world. Instrumentation is identified, the operation of the various elements is explained, and samples of recorded data are reproduced.

G-45744
Kheĭsin, V.E., **Supplying accurate regional aerogeophysical data to antarctic navigation** [Tochnost' navigatsionnogo obespecheniia regional'nykh aerogeofizicheskikh issledovaniĭ Antarktidy], Teoriia i praktika regional'nykh geofizicheskikh issledovaniį Mirovogo okeana i Antarktiki. Sbornik nauchnykh trudov (Theory and practice of regional geophysical investigations in the world ocean and the Antarctic. Collection of scientific works). Edited by N.N. Rzhevskiĭ and M.A. Kholmianskiĭ, Leningrad, Sevmorgeologiia, 1989, p.56-61, In Russian.

The basic type of equipment, its operation, and data processing involved in supplying accurate information for safe navigation in rough antarctic waters are described.

G-45812
French Polar Expeditions [Expéditions Polaires Françaises], Paris, 1987, n.p., In French.

The French Dumont d'Urville Station, established in 1956, is described. Research at the station has included studies on atmospheric physics, geomagnetism, seismology, human and animal biology, population dynamics, physiology, meteorology, and polar engineering. Temperatures rarely rise above 0 C, may drop to -35 C, and usually range between -10 and -20 C. Winds are usually 50 to 80 km/h with gusts up to 200 km/h. The highest recorded wind was 320 km/h in Jan. 1972. Two site plans of the station in 1962 and 1985, and a brief chronology of the French Polar Expeditions in Antarctica from 1950 to 1983 are included.

G-45815
Gillingham, P.R., **Prospects for an antarctic observatory,** *Astronomical Society of Australia. Proceedings,* 1991 9(1), Asian-Pacific Regional Astronomy Meeting, 5th. Edited by M.C.B. Ashley et al, p.55-56, 5 refs.

Following a 1989 USA conference on Astrophysics from Antarctica, a number of proposals have been advanced to exploit the great astronomical potential of this region. The most interesting is for an international station at a new site chosen for optimum astronomical performance. Near the highest point of the ice plateau (where the pressure altitude is about 5000 m), the extremely dry cold atmosphere will allow effective observation through many wavelength ranges currently inaccessible from the ground. There is also reason to believe that better seeing than is otherwise obtainable from the Earth's surface may be achievable. Astronomers interested in future antarctic observing should co-operate in presenting cases to their governments for support facilities there. (Auth.)

G-45887
Incoll, P.G., **Antarctic lessons on prefabrication,** [Melbourne, Australian Construction Services, 1991], 10 leaves, 4 refs.

The architect author discusses some of the things learned from a number of years working on antarctic construction projects. Despite numerous disadvantages, the advantages inherent in prefabricated construction still make this the construction method of choice. Cited especially are the ease of replacement of building elements and better original quality of materials and work at factory sites, as opposed to the uncomfortable and even dangerous antarctic venues.

G-45888
Incoll, P.G., **Overview of antarctic buildings and services for administrators, scientists and engineers,** [Melbourne], Australian Construction Services, 1990, 27p.

This paper covers briefly the problems encountered in the provision of buildings in Antarctica dealing in turn with: building in Antarctica; typical solutions to these problems; and implementation of buildings to serve projects in Antarctica. The problems and solutions are treated in parallel sections and deal with logistical considerations such as remoteness; technical and human unreliability in communications; difficulty of access (transport, the ice barrier, and lack of cargo- and people- handling facilities); transient populations; harsh climate; terrain; and environment. Psychological factors include isolation, few people, relationships, and mental deprivation.

G-45949
Kohnen, H., ed, Teixeira, A.J., ed, Fowler, A.N., ed, **Proceedings of the Fourth Symposium on Antarctic Logistics and Operations, Sao Paulo, Brazil, 16 to 18 July 1990,** Brasília, Brazil, Gráfica e Editora Ideal Ltda, ⌊1991⌋, 312p., For individual papers see 46-3003 through 46-3030 or G- 45950 through G-45977.

The scope of antarctic logistics and operations involves providing the correct materials, supplies and provisions at the correct time and place they are needed in Antarctica. Certainly this means meticulous planning and the proper use of all kinds of highly specialized sea, air and land transportation, including the development of transport technologies appropriate for use in the rigorous antarctic environment. It also means facilities design, construction and maintenance; communications including the use of space technologies; field operations under extreme conditions; innovative provisions for health care and safety; and the extraordinary extension of both new and proven methods and technologies for the protection of the environment in Antarctica. In short, antarctic logistics comprise everything that is required to work efficiently when time is of the essence, to be transported to and from, and to survive in safety and reasonable comfort in one of the harshest and most remote areas of the world. In twenty- eight papers and two abstracts, this symposium delves into such logistical aspects of antarctic science as the environment, energy alternatives, communications, satellites, transportation, and architectural psychology.

G-45950
Cervellati, R., Metalli, P., Testa, L., **Current developments in environmental protection at Terra Nova Bay Station,** Symposium on Antarctic Logistics and Operations, Fourth, Sao Paulo, Brazil, 1990. Proceedings, edited by H. Kohnen, A.J. Teixeira, and A.N. Fowler, Brasília, Brazil, Gráfica e Editora Ideal, Ltda, [1991], p.1-14.

Environmental safeguard procedures of the Italian Antarctic Program at Terra Nova Bay are reviewed. Members of the expedition are trained and bound to follow a code of conduct. Local waste production is kept to a minimum. Figures are given for the last expeditions. Wastes are sorted according to type, only partly disposed of after treatment in the Antarctic Treaty Area by means of an incinerator and a water treatment plant, and mostly returned to Italy. The Station environmental impact is evaluated by monitoring the airborne particulate (tables on elemental composition are given) and the effluents of the above plants. (Auth.)

G-45951

Geddes, D., **New Zealand antarctic research programme waste management procedures,** Symposium on Antarctic Logistics and Operations, Fourth, Sao Paulo, Brazil, 1990. Proceedings, edited by H. Kohnen, A.J. Teixeira, and A.N. Fowler, Brasília, Brazil, Gráfica e Editora Ideal, Ltda, ⌈1991⌉, p.15-24.

The main elements of the waste management procedures are the separation of waste into three categories—burnable, non- burnable, and hazardous—and the subsequent disposal of each category of waste. Burnable waste is burnt in a high-temperature, double-burning incinerator at Scott Base, while all other dry waste is returned to New Zealand by either aircraft or ship for disposal. Where possible, material which is suitable for recycling (e.g. aluminum cans) is handled separately. With only minor exceptions, waste generated in field camps is returned to Scott Base for disposal through the above system. (Auth.)

G-45952

Sayers, J.C.A., **Environmental management of Australia's antarctic program,** Symposium on Antarctic Logistics and Operations, Fourth, Sao Paulo, Brazil, 1990. Proceedings, edited by H. Kohnen, A.J. Teixeira, and A.N. Fowler, Brasília, Brazil, Gráfica e Editora Ideal, Ltda, [1991], p.26-40.

Operational guidelines and environmental impact assessment procedures have been developed to implement and supplement existing Australian environmental legislation, Antarctic Treaty Recommendations and obligations under other international agreements. Management plans for stations are being developed. Environmental awareness is encouraged and developed in expeditioners, starting at the recruitment stage. The expeditioner induction program involves progressively more detailed instruction on environmental management. A more intensive training program on environmental responsibilities is given to Station Leaders, Station Environment Officers and Inspectors appointed under Australian Antarctic environment protection legislation. Vessels under charter are required to comply with strict requirements for the handling and disposal of shipboard wastes. Waste management plans for stations require the segregation of materials for either local incineration in high temperature incinerators or retrograding to Australia. All waste tips were closed in 1985 and a program of returning waste materials, to the maximum practicable extent, and rehabilitating the landscape is underway. The Australian Antarctic Division is also paying particular attention to improving procedures for the transport, handling and storage of fuels. (Auth.)

G-45953

Stephan, B., **Recycling and optimized utilization of materials at antarctic research stations,** Symposium on Antarctic Logistics and Operations, Fourth, Sao Paulo, Brazil, 1990. Proceedings, edited by H. Kohnen, A.J. Teixeira, and A.N. Fowler, Brasília, Brazil, Gráfica e Editora Ideal, Ltda, ⌈1991⌉, p.41-51, 3 refs.

The lecture summarizes the consumption and treatment of materials and the waste production by antarctic research stations and presents feasible techniques to reduce, reuse, recycle and treat the unneeded materials. Stress is put on proposals to improve the operation of essential technical components of an antarctic research station as power generation stations, water supply and waste water treatment systems under the aspects of recycling and minimization of local pollution. Problems of the treatment of solid and chemical wastes under the conditions in Antarctica are discussed. (Auth.)

G-45954

Wilkniss, P.E., Chiang, E., **Fuel spill clean-up in the Antarctic,** Symposium on Antarctic Logistics and Operations, Fourth, Sao Paulo, Brazil, 1990. Proceedings, edited by H. Kohnen, A.J. Teixeira, and A.N. Fowler, Brasília, Brazil, Gráfica e Editora Ideal, Ltda, [1991], p.52-65.

In this paper experiences with several fuel spills and the lessons learned during attempts to clean up their aftermaths are described. To illustrate the unique aspects of response and cleanup, examples of spills are selected that occurred in three distinct antarctic environments—marine, coastal; ice shelf, coastal; and antarctic ice sheet, polar plateau. All of these accidents have been publicized and described in television, radio, newspapers, scientific articles, and other publications. This paper focuses on the "inside story"—namely, the experiences from the viewpoint of national antarctic program management and related aspects. (Auth.)

G-45955

Engler, M., **Technology limited to the measures for environmental protection in Adélie Land,** Symposium on Antarctic Logistics and Operations, Fourth, Sao Paulo, Brazil, 1990. Proceedings, edited by H. Kohnen, A.J. Teixeira, and A.N. Fowler, Brasília, Brazil, Gráfica e Editora Ideal, Ltda, ⌈1991⌉, p.66-71.

As part of the French engineering program in Adélie Land, all possible measures are being taken to protect the natural environment. These measures involve compensatory actions to ease the habitat disruption for creatures which have established colonies in the area where an airstrip is being built. They also provide for undertaking technological studies to find better ways to dispose of the various kinds of waste products which accumulate from the nature of the environment itself and its isolation. To compensate for bird colony disturbance, zones have been set aside as artificial nesting sites for Adélie penguins, snow petrels, and cape pigeons, and access routes for emperor penguins have been laid out. A proposal has also been made to build a base at Dome C where new principles of waste management will provide for recycling of waste water, global treatment of waste materials, and improved ventilation. (Auth. mod.)

G-45956

Heidelberg, G., **Vertical axis wind turbine with integrated magnetic generator,** Symposium on Antarctic Logistics and Operations, Fourth, Sao Paulo, Brazil, 1990. Proceedings, edited by H. Kohnen, A.J. Teixeira, and A.N. Fowler, Brasília, Brazil, Gráfica e Editora Ideal, Ltda, [1991], p.72-82, 2 refs.

Favorable annual wind conditions at the Neumayer winter station suggest the use of wind turbines as alternative energy resources. This is to reduce the fuel consumption and consequently the emission of the station. A smaller amount of fuel being stored would simultaneously minimize the potential hazards of fuel spills. As a first step towards this goal, a prototype of a Vertical Wind Turbine (VAWT) with a maximum power output of 20 KW has been developed as a joint project between the Alfred-Wegener-Institute, Germanischer Lloyd, Hochschule Bremerhaven and Heidelberg Motor. The rigid rotor consists of three straight steel rotor blades; the diameter of the rotor is 10 m with a swept area of 56 sq m. The rotor is mounted on a telescopic tower. The permanent magnetic ring of the running field generator is integrated into the support structure of the tower, while the stator is mounted to the tower. A pitch control and yawing system are not required. The whole system has only one rotating part. The wind turbine, which was tested in 1990 on a special test site on the German North Sea coast, is scheduled to be integrated into the diesel electrical system of Neumayer Station in 1991 for further testing. (Auth. mod.)

G-45957

Ishizawa, K., Kimura, S., Takanaga, T., **New designed wind generator for Antarctica,** Symposium on Antarctic Logistics and Operations, Fourth, Sao Paulo, Brazil, 1990. Proceedings, edited by H. Kohnen, A.J. Teixeira, and A.N. Fowler, Brasília, Brazil, Gráfica e Editora Ideal, Ltda, [1991], p.83-95.

A new wind generator for Antarctica was designed, taking past problems into consideration. Main improvements are as follows: (1) fixed pitch and fixed yaw control; (2) permanent magnet exciter for the AC generator; and (3) a monopole type tower for minimal snow drift to the leeward. The output power will be about 1 kW at 20 m/s of wind speed. The generator is planned to be installed and operated at Asuka Station in 1991. (Auth.)

G-45958

Sheinsteĭn, A.S., Shpil'rain, E.E., **Potential for renewable energy sources in the Antarctic,** Symposium on Antarctic Logistics and Operations, Fourth, Sao Paulo, Brazil, 1990. Proceedings, edited by H. Kohnen, A.J. Teixeira, and A.N. Fowler, Brasília, Brazil, Gráfica e Editora Ideal, Ltda, [1991], p.96-105, 13 refs.

The potential for use of solar and wind energy systems in the Antarctic was analyzed. Based on a specially designed procedure, annual solar radiation intake on inclined solar collectors was obtained and their optimal orientation was defined. Advantages of the use of solar heating systems are shown. Economical performances of solar and wind power systems. are given. The potential for low temperature sources is discussed. (Auth.)

G-45959

Blasi, L., De Simone, M., Testa, M., **Project and management criteria and scientific support to integrated communication system of Italian Antarctic Research Program,** Symposium on Antarctic Logistics and Operations, Fourth, Sao Paulo, Brazil, 1990. Proceedings, edited by H. Kohnen, A.J. Teixeira, and A.N. Fowler, Brasília, Brazil, Gráfica e Editora Ideal, Ltda, [1991], p.106-117.

The project criteria of the integrated communication systems of the Italian Antarctic Research Program are presented. These systems include different kinds of installations so that transmissions can be carried out on HF, VHF, UHF and satellite bands. Also presented are the integration problems of various systems and the completions made according to different needs due to the extreme environmental and climatic operation conditions. Particular care has been devoted to solving engineering problems due to the installation of large dimension antennas. Also described is the future development of lines of telecommunication activity with particular attention to digital transmission in HF and satellite bands. Research activities which support the communication systems in Italy and in Antarctica are discussed, with emphasis on propagation and research on the physics of the ionosphere. (Auth. mod.)

G-45960

Dougherty, T., Nitschke, R., **SARSAT beacon use in Antarctica,** Symposium on Antarctic Logistics and Operations, Fourth, Sao Paulo, Brazil, 1990. Proceedings, edited by H. Kohnen, A.J. Teixeira, and A.N. Fowler, Brasília, Brazil, Gráfica e Editora Ideal, Ltda, [1991], p.118-126.

The United States Antarctic Program (USAP) began equipping selected remote scientific field parties with Search and Rescue Satellite (SARSAT) beacons during the 1989-90 austral summer season. These beacons offer a tremendous potential for mobile remote teams to transmit their precise location and an emergency notification to their home base without use of VHF, UHF or HF communications. This capability is particularly valuable as a means to increase the safety net for scientific investigators during the coming years of increasing solar flare activity with its negative impact on HF propagation. Two years of investigation, research and trials, with lessons learned along the way, led to the decision to acquire the beacons and deploy them in the field. There have been some growing pains. More is being learned about their use and about a number of problem areas, including hazardous cargo designation, closing the communication loop back to the home station, and necessary international coordination for testing. (Auth. mod.)

G-45961

Ejiri, M., Takeuchi, S., Sato, N., **Multipurpose satellite data receiving system constructed at Syowa Station,** Symposium on Antarctic Logistics and Operations, Fourth, Sao Paulo, Brazil, 1990. Proceedings, edited by H. Kohnen, A.J. Teixeira, and A.N. Fowler, Brasília, Brazil, Gráfica e Editora Ideal, Ltda, [1991], p.127-134.

A Multipurpose Satellite Data Receiving (MSDR) system with a large dish antenna of 11 m in diameter was built at Showa Station. In the austral summer 1988, the foundation for the antenna structure was constructed, together with a building of 120 sq m and a cable duct of about 80 m. In 1989 the system was completed with the installation of the parabolic antenna and radome (17 m in diameter) on the foundation. It has been operating by receiving and processing S-and X-band data from satellites since Feb. 1989. This system also has the capability to receive a signal from radio sources and can be used as a very long baseline interferometer to determine the precise position of Showa Station. The antenna system was designed to satisfy these conditions: the radome can stand a blizzard of a maximum wind speed of 60 m/s; the antenna structures including azimuth and elevation drive mechanisms can operate at an air temperature of -45 C. All structures are divided into pieces which can be transported by the icebreaker *Shirase* and easily reassembled. (Auth.)

G-45962

Nottarp, K., Reiniger, K.D., **Scientific goals and technical design for the combined German ERS-VLBI antarctic ground station,** Symposium on Antarctic Logistics and Operations, Fourth, Sao Paulo, Brazil, 1990. Proceedings, edited by H. Kohnen, A.J. Teixeira, and A.N. Fowler, Brasília, Brazil, Gráfica e Editora Ideal, Ltda, [1991], p.135-142.

The Federal Republic of Germany will install during the antarctic summer 1990/91 a combined system for ERS satellite data reception and VLBI measurements at the Chilean antarctic base Bernardo O'-Higgins in a cooperative project. The paper describes scientific goals and the chosen technical design for this complex installation. (Auth.)

G-45963

Winter, B.W., **Air cushion vehicle transport in Antarctica: from concept to reality,** Symposium on Antarctic Logistics and Operations, Fourth, Sao Paulo, Brazil, 1990. Proceedings, edited by H. Kohnen, A.J. Teixeira, and A.N. Fowler, Brasília, Brazil, Gráfica e Editora Ideal, Ltda, ⌊1991⌋, p.144-160, 10 refs.

The paper considers the design criteria that went into selecting an air cushion vehicle and its delivery at McMurdo Station. The arrival of the air cushion vehicle was only the beginning; an evaluation and operational plan to use this unique vehicle had to be developed. A summary of the operational statistics and review of some of the missions accomplished by the vehicle are made in conjunction with a slide presentation of actual missions in the McMurdo area. The travel capability in regards to surface conditions encountered is also discussed. A review of modifications made to the existing vehicle and changes recommended for future air cushion vehicles procured for antarctic research to expand its operational capabilities are included in the presentation. The conclusion shows that the air cushion vehicle is a means by which science researchers and logistical support can have increased mobility over the antarctic terrain. This is accomplished with improved safety for its users at little or no operating cost increase. (Auth.)

G-45964

Mellor, M., **Antarctic fields,** MP 3032, Symposium on Antarctic Logistics and Operations, Fourth, Sao Paulo, Brazil, 1990. Proceedings, edited by H. Kohnen, A.J. Teixeira, and A.N. Fowler, Brasília, Brazil, Gráfica e Editora Ideal, Ltda, ⌊1991⌋, p.162-173, 7 refs.

Following a summary of recent U.S. air activities in Antarctica, aircraft runways are considered. Various airfield options from open-field landings to conventional paved runways are dealt with, the relevant factors being given in tables that cover (a) construction and maintenance and b) operations. Bearing capacity, rutting resistance, surface roughness and runway dimensions are discussed. It is concluded that a system of hard- surface runways for conventional aircraft is technically feasible. (Auth.)

G-45965

Kliuchnikov, G.IA., Klopov, V.P., Aver'ianov, V.G., Petrov, V.N., **Improvement of methods for construction of high-strength aerodromes in Antarctica,** Symposium on Antarctic Logistics and Operations, Fourth, Sao Paulo, Brazil, 1990. Proceedings, edited by H. Kohnen, A.J. Teixeira, and A.N. Fowler, Brasília, Brazil, Gráfica e Editora Ideal, Ltda, ⌊1991⌋, p.174-180.

The example of the structure of snow and snow/ice surfaces created for the first time at the Molodezhnaya AMC for IL- 18D aircraft with take-off mass of 64 t is shown. The structure consists of the following layers: a protective layer of fresh snow with any strength; surface made of strengthened firn and snow; artificial foundation made of firn and snow; artificial foundation made of strengthened firn; and natural foundation of firn with proven strength. The strength of layers decreases from the upper layer downwards in accordance with the regularities of reduction of stresses with the change of snow/firn cover depth. Stresses were determined by equipment consisting of membrane gauges and different amplifiers of electric signals. The total thickness of strengthened snow layers was 70 cm and was equal to the active depth of aircraft wheel impact. (Auth. mod.)

G-45966

Jones, D., **Development, design and construction of an antarctic research and supply vessel,** Symposium on Antarctic Logistics and Operations, Fourth, Sao Paulo, Brazil, 1990. Proceedings, edited by H. Kohnen, A.J. Teixeira, and A.N. Fowler, Brasília, Brazil, Gráfica e Editora Ideal, Ltda, ⌊1991⌋, p.181-190.

The British Antarctic Survey needed to replace the 1956-built *John Biscoe* in order to meet expanding needs for the relief of the five antarctic stations and to enhance its limited marine research capability. A dual-role vessel with improved ice capability and enhanced cargo-carrying capacity, including the ability to transport aviation turbine fuel in bulk was sought. To address the research objectives, a representative group of users of the existing UK research vessel fleet was asked to define a scientific specification covering current requirements and anticipated developments in marine science through the expected life span of the vessel. The most significant and ultimately most expensive aspect of the resultant specification was the demand for limitation of underwater radiated noise during research cruises. The vessel is being constructed with large working deck and laboratory areas, sophisticated and comprehensive data acquisition and processing facilities, and largely single-berth scientific accommodation. (Auth. mod.)

G-45967

Orlandini, F., Cordano, A., **Design of an ocean-research and logistics support vessel for the Italian scientific base in Antarctica,** Symposium on Antarctic Logistics and Operations, Fourth, Sao Paulo, Brazil, 1990. Proceedings, edited by H. Kohnen, A.J. Teixeira, and A.N. Fowler, Brasília, Brazil, Gráfica e Editora Ideal, Ltda, [1991], p.191-205.

The development of the Italian scientific base and relevant research activities require the exploitation of a specially designed vessel. The ship's design was defined taking into account experience gained in previous expeditions, development programs of the Italian base in Antarctica, and research activities to be carried out. Consequently, the vessel's design criteria were developed and defined on the basis of the mission profile. (Auth.)

G-45968

Mälkki, P., Niemistö, L., Aro, E., **R/V *Aranda* on the Weddell Sea in season 1989-90,** Symposium on Antarctic Logistics and Operations, Fourth, Sao Paulo, Brazil, 1990. Proceedings, edited by H. Kohnen, A.J. Teixeira, and A.N. Fowler, Brasília, Brazil, Gráfica e Editora Ideal, Ltda, ⌊1991⌋, p.206-219.

The FINNARP-89 expedition consisted of two sections: research carried out at Aboa research station and the marine research program based on a new research vessel. The marine research program was carried out on the Weddell Sea in the 1989-90 season. There were seven marine research programs. In all about 80% of the programs and samplings planned were carried out. The new research vessel especially tailored to marine research was a compromise between a large and a small vessel in many respects. During the expedition, however, shortcuts, restrictions and limitation in equipment and instruments were observed. The total time period for the expedition was 150 days and for execution of scientific programs, 56 days. It was observed that too many scientific programs were included; the time table was too tight and some of the projects ran out of time. Future expeditions like this should not be divided in two parts so cooperation between various projects could be made more effective. The projects in operation could also be more flexible. Some parts of the communication system were not satisfactory and should be reviewed.

G-45969
Martin, A.G., **On development of a preventive maintenance program for McMurdo Station, Antarctica,** Symposium on Antarctic Logistics and Operations, Fourth, Sao Paulo, Brazil, 1990. Proceedings, edited by H. Kohnen, A.J. Teixeira, and A.N. Fowler, Brasília, Brazil, Gráfica e Editora Ideal, Ltda, [1991], p.220-233.

This presentation covers the development of a preventive maintenance program at McMurdo Station. The presentation outlines the objectives of a preventive maintenance program and provides an overview of the department for which the preventive maintenance program was developed. The presentation then provides a brief chronological sequence of events that took place during the development process. Next it reviews the six computer modules that are the nucleus of the preventive maintenance program. The presentation concludes by identifying some of the benefits the preventive maintenance program has provided, offers several practical suggestions, and identifies problems to be aware of. (Auth.)

G-45970
Kim, D.H., Kwok, K.C.S., Rohde, H.F., **Design guidelines of antarctic buildings for wind loads and snow drifting,** Symposium on Antarctic Logistics and Operations, Fourth, Sao Paulo, Brazil, 1990. Proceedings, edited by H. Kohnen, A.J. Teixeira, and A.N. Fowler, Brasília, Brazil, Gráfica e Editora Ideal, Ltda, [1991], p.234-245, 13 refs.

This paper describes a wind tunnel study to evaluate the wind-induced loads and snowdrift formation around a number of different shapes of elevated buildings for antarctic use. A 1/50 scale boundary layer wind model was generated in a closed-circuit boundary layer wind tunnel at Sydney University, Australia. A force balance was used to measure the aerodynamic forces on the elevated models. Coefficients of mean drag, lift, and standard deviations of drag and lift are presented. Snowdrifting simulations were performed by using sodium bicarbonate as a snow model. A Moiré fringe camera, image-grabbing system and contour analyzing software were used to analyze the data. The result showed that elevated antarctic buildings are recommended to have chamfered or radiused corners. The chamfer or radius should be as large as practicable, given the restriction on the internal layout of the building. It was also evident that the buildings should be raised above ground to avoid the attachment of snowdrifts against the building at the leeward side. (Auth.)

G-45971
Ishizawa, K., Hannuki, T., Sano, M., Kusunoki, K., **Settlement and deformation of buildings at Asuka Station,** Symposium on Antarctic Logistics and Operations, Fourth, Sao Paulo, Brazil, 1990. Proceedings, edited by H. Kohnen, A.J. Teixeira, and A.N. Fowler, Brasília, Brazil, Gráfica e Editora Ideal, Ltda, [1991], p.246-256.

The buildings at Asuka Station were erected on the ice sheet between Dec. 1984 and Feb. 1987. Those buildings for living quarters, power plant, observation hut, workshop and passages are now almost buried in the snow. Measurements on the movement and settlement of buildings in relation to ice sheet flow and snow accumulation have been carried out every year since 1985. Horizontal northward movement of the living quarters was about 1.0 m/a. Settlement of buildings was noticeable in the first year, but decreased gradually. Uneven settlement within a hut was observed, being due to the difference in the snow accumulation on the windward and leeward sides of the hut; snow drift on the lee side sometimes reached 5 m above the undisturbed surface. (Auth.)

G-45972
Lori, A., Voli, D., Zucchelli, M., **Description and design criteria of the Italian base in Antarctica: A.I.M., automatic integrated module,** Symposium on Antarctic Logistics and Operations, Fourth, Sao Paulo, Brazil, 1990. Proceedings, edited by H. Kohnen, A.J. Teixeira, and A.N. Fowler, Brasília, Brazil, Gráfica e Editora Ideal, Ltda, [1991], p.257-271.

Italian scientific teams have been working now in Antarctica for six years. The summer base has grown during these years and all building plans are practically finished. Design criteria and development plans have been strongly affected by the extreme environmental conditions. During the summer there is little time available for operations. This has not only heavily influenced the development of the buildings, but also limited the duration of scientific activities. Even those activities which do not require personnel, such as the recording of environmental data, have been discontinued when all personnel leave Antarctica for the winter. The Antarctic Project has decided, after requests from the Italian scientific community, to develop an automatic system capable of generating electrical energy for nine months of the year to permit the collection of data and its transmission to Italy. (Auth.)

G-45973
Nordlund. O.P., **FINNARP 88 construction activities,** Symposium on Antarctic Logistics and Operations, Fourth, Sao Paulo, Brazil, 1990. Proceedings, edited by H. Kohnen, A.J. Teixeira, and A.N. Fowler, Brasília, Brazil, Gráfica e Editora Ideal, Ltda, [1991], p.272-277.

The Finnish Antarctic Station Aboa comprises one half of the Nordenskiöld base located at the mountain base (about 73S, 13W), the other half being the Swedish station Wasa. The stations were built during the austral summer of 1988-89 to serve the national research programs of both countries independently. The design principles and the equipment for the station are described. The construction work on the site was completed in just 30 days by a structural engineer, an electronics engineer, a mechanical technician, and a medical doctor. The transportation effort to haul 7 living containers, 4 ISO containers, a communication tower, a steel arch garage tent, fuel, food and equipment for two coming seasons (a total of more than 100 metric tons) 150 km inland in close collaboration with the Swedes, is described. The heat and electricity generation at the station and satellite communication and radio equipment are discussed. (Auth. mod.)

G-45974
Tüg, H., **Autonomous antarctic observing station,** Symposium on Antarctic Logistics and Operations, Fourth, Sao Paulo, Brazil, 1990. Proceedings, edited by H. Kohnen, A.J. Teixeira, and A.N. Fowler, Brasília, Brazil, Gráfica e Editora Ideal, Ltda, [1991], p.278-286, 7 refs.

This paper describes the development of an automatic unattended platform for multi-purpose applications in polar regions. The platform consists of a 10' measuring container and two symmetrically mounted fuel tanks in 10' standard frames. The main unit contains the complete power generation, air temperature regulation, a central micro-VAX computer and additional electronic racks. Five kilowatts of electrical power (220 V AC, 50 Hz) are available for about one year of continuous operation. In late 1990 the station will be placed close to the German Georg von Neumayer base to collect meteorological, oceanographic and glaciological data. These data are stored internally but also telemetered via the polar orbiting bidirectional satellite TUBSAT to Bremerhaven. (Auth.)

G-45975

Incoll, P.G., **Influence of architectural theory on the design of Australian antarctic stations,** Symposium on Antarctic Logistics and Operations, Fourth, Sao Paulo, Brazil, 1990. Proceedings, edited by H. Kohnen, A.J. Teixeira, and A.N. Fowler, Brasília, Brazil, Gráfica e Editora Ideal, Ltda, [1991], p.287-303, 19 refs.

Habitability theories of architectural design are used as the basis of a thesis which states that the correct architectural design of a building can create a positive effect on the morale of its occupants. This effect is of more value to buildings in Antarctica than in any other place on Earth. Applications of these theories to the design of Australia's antarctic buildings in the 1980s are described, and a project to assess their effect on the morale of the occupants is suggested. (Auth.)

G-45976

Bardin, V.I., Sheinsteĭn, A.S., **New concepts for Antarctica,** Symposium on Antarctic Logistics and Operations, Fourth, Sao Paulo, Brazil, 1990. Proceedings, edited by H. Kohnen, A.J. Teixeira, and A.N. Fowler, Brasília, Brazil, Gráfica e Editora Ideal, Ltda, [1991], p.305-307, 2 refs.

New research programs and design concepts for Antarctica were suggested at the Soviet-American seminar for Architecture in Extreme Environments, which was held in Moscow in Apr. 1990. This paper discusses Antarctic Planetary Testbed (USA) and Design of the Antarctic Polar Station Based on Energy Saving Options (USSR) concepts.

G-45977

Sheinsteĭn, A.S., **Pilot solar water heater testing in Antarctica,** Symposium on Antarctic Logistics and Operations, Fourth, Sao Paulo, Brazil, 1990. Proceedings, edited by H. Kohnen, A.J. Teixeira, and A.N. Fowler, Brasília, Brazil, Gráfica e Editora Ideal, Ltda, [1991], p.308-312, 1 ref.

A solar water heater has been designed for harsh environments. The results of testing a pilot water heater at Molodezhnaya Station are discussed. The results indicate that in Antarctica a flat plate solar collector could be used for water heating to temperature levels of 50-60 C. It was shown that in polar regions an inclined collector discretely moving to track the sun would receive higher solar radiation than fixed collectors. (Auth. mod.)

G-46065

Kimura, S., Ishizawa, K., Susuki, K., **Development and low temperature test of the generator of a wind turbine system for Antarctica,** *Wind engineering,* 1991 15(2), p.114-127, 6 refs.

This paper describes the low temperature testing of a wind turbine system to be utilized for producing and supplying electricity to an observation camp in Antarctica. The generator installed in the wind turbine system was newly designed. Test results indicate that the generator will perform efficiently even in the low temperature corresponding to that of the observation camp. (Auth. mod.)

G-46073

Railsback, S.F., **Mixing characteristics of submerged and surface wastewater outfalls at McMurdo Station,** *Polar record,* Apr. 1992 28(165), p.149-154, 7 refs.

The mixing characteristics of the existing surface wastewater discharge and a proposed submerged wastewater outfall at McMurdo Station are compared. The wastewater is a combination of sanitary sewage and brine from a desalination plant. Dispersion from a proposed submerged (15 m-deep) outfall was simulated using the CORMIX1 computer model. The mixing characteristics of the surface discharge were estimated from visual observations and a conceptual analysis. The wastewater was found to be less dense than ambient seawater. From the submerged outfall, the effluent is predicted to be diluted by ratios ranging from 80:1 to 450:1 between the point of discharge and the point where the effluent plume begins to spread out underneath the sea ice. The variation in dilution depends mostly on tidal current speed, and dilution of the wastewater with desalinator brine is predicted to provide only minor reductions in concentrations of the effluent. The heat content of the discharge plume from a submerged outfall is expected to cause at least partial melting of the sea ice from underneath. A surface discharge provides much less mixing with ambient water before the effluent spreads along tidal cracks and underneath the sea ice. The submerged discharge is expected to confine settleable wastewater solids to a benthic area near the outfall, but a surface discharge allows solids to settle over a wider area. (Auth.)

G-46088

Broman, L., **On the possibility of space generated solar electricity for the Antarctic,** *Space power,* 1991 10(1), p.19-20, 2 refs.

On the basis that the use of fossil fuels to generate energy creates environmental hazards, and that the spread of radioactivity from a nuclear plant would be just as unacceptable a risk in Antarctica, it is proposed that a space solar power plant be placed in a geostationary orbit 36,000 km above the Earth's equator. A receiving station, which must be north of 81.3 deg latitude, would be placed in Antarctica; a figure illustrates where an appropriately placed geostationary satellite would appear 0.5 and 10 deg above the horizon in Antarctica.

G-46089

Cutler, A.H., **Comment on the possibility of space generated solar electricity for the Antarctic,** *Space power,* 1991 10(1), p.21-22, 2 refs. For article being commented on see G-46088.

While solar power satellites would produce no chemical pollution of the Antarctic, their use would introduce significant amounts of heat into an environment where this could be significant. It is unlikely that either a satellite's transmitting antenna or the ground station receiving antenna would be large enough to ensure that most of the transmitting microwaves were converted to useful energy. Thus, it is likely that rather large amounts of microwave energy would end up heating the antarctic environment. A total heat input of 1 GW is about equivalent to the solar flux falling on 2 sq km near the south pole during midsummer. While this would not create continent-wide effects, it clearly could affect local weather patterns, particularly in the winter.

G-46092

Castagnoli, F., **Backscattering lidar system at Terra Nova Bay,** International Laser Radar Conference. Conference abstracts, [1988], p.206-208, 3 refs.

An elastic backscattering lidar is described. The system has been designed to operate in Antarctica under the Italian National Program for Antarctic Research. The system has collected data on meteorological and atmospheric parameters. The evaluations of these parameters are made in other papers presented at this conference. The system is composed of a Nd-Yag laser source, a newtonian telescope, two receiving channels and acquisition and presentation equipment controlled by a personal computer. All of the system is housed in a container; some technical and mechanical solutions have been adopted to solve environmental problems. (Auth.)

G-46094

Hoffmann, G., **Quarrying in Antarctica: Australian territory's rebuilding programme,** *Quarry management,* Jan. 1992 p.13-18.

Quarrying at Mawson and Casey Stations is briefly reviewed as it pertains to the antarctic rebuilding program. The rock derived is used for roads and other aspects of station reconstruction. Advantages and disadvantages of the rock and its location near the stations are discussed and the efficiencies of the drilling equipment and vehicles used in the various quarrying phases are noted. Effects of the operation, such as dust problems downwind of the site, disruptions of petrel nesting sites, and noise from blasting, are shown, and alleviating actions taken are described.

G-46095

Incoll, P.G., **Architecture in extremity: determining influences on antarctic architecture,** Conference on Architecture in Isolation, [1991], 16p., 20 refs.

In 1976 a program was commenced to completely rebuild Australia's three continental antarctic stations: Mawson, Davis and Casey. By 1990 this program was almost complete at Casey, slightly less so at Davis and about 60% complete at Mawson. The work provides the basis for this paper. It is relevant to this conference on "Architecture in Isolation" because Antarctica is at one of the extremities of isolation available on this planet. One of the themes of discussion at the conference is the relative effect of two different influences on architecture—those derived from the locality of the site, and those derived from the world away from the site. These themes can be seen quite clearly in operation in Antarctica, and the value of the extreme nature of the locality for our purposes is that it makes their operation easier to see and discuss than at other less extreme places.

G-46096

Charrett, D.E., Incoll, P.G., Kozlovsky, N., **Modular buildings for Antarctica,** First National Structural Engineering Conference, 1987, [1987], 9p., 4 refs.

The paper provides a review of the Australian philosophy on what antarctic buildings should contain, how they should be constructed, and what strength standards should be adhered to. The buildings should be efficient, steel braced, have replaceable external cladding, have standard prefabricated components, need minimum on-site labor, should minimize snow drift problems, incorporate fire safety devices, and be trial erected before being packed for shipping. Shipping containers have sufficient strength to withstand, with minimum damage, the effects of rough seas and rough handling. Buildings are standardized in dimensions and architectural details such as floors, walls, doors, partitions, insulation, service openings, vapor seals, and closed gaps at joints. Advantages and disadvantages of the modular concept are noted.

G-46102

Kimura, S., Ishizawa, K., Suzuki, K., **Development and low temperature test of the output controller of the wind turbine system for Antarctica,** *Wind engineering,* 1991 15(4), p.176-186, 6 refs.

The output controller as the main component of a wind turbine system for producing electricity at an observation camp in Antarctica was developed and tested in a simulated low temperature environment. The introduction of a load system provided through a set of batteries, a snow thawer and a dummy load, was made. The test was carried out in order to verify proper functioning of the controller at low temperatures corresponding to those in Antarctica. The test results show that it would work as designed. (Auth.)

G-46138

Rohde, H.F., **Engineering: an essential means for conserving Antarctica and achieving cost-effective built infrastructure,** Pacific/Asia Offshore Mechanics Symposium, First, Seoul, Korea, June 24-28, 1990. Proceedings, Vol.1. Edited by J.S. Chung et al, Golden, CO, International Society of Offshore and Polar Engineers, 1990, p.29-38, 21 refs.

DLC TC1665.P34 1990

Antarctica's isolation and harshness has demanded the support of highly engineered built infrastructure. There is a burgeoning acknowledgment that much of this infrastructure is destroying the environment and is extraordinarily expensive, which in turn compromises and bleeds research programs, and is an embarrassment to many nations. The source of these problems is twofold: political and economic short-sightedness, and the reliance of antarctic engineering on the simplistic application of polar technology based on arctic research and experience. A new integrated philosophy of engineering is proposed based on antarctic conditions, environmental protection, human significance and life-cycle cost-effectiveness. Two feasibility studies of projects, one large and one small, provide a glimpse of the substantial environmental, scientific, inspirational, commercial and Treaty benefits of built infrastructure employing such an engineering philosophy. (Auth. mod.)

G-46140

Kim, D.H., Kwok, K.C.S., Rohde, H.F., **Wind loads on and snowdrift around antarctic buildings,** Pacific/Asia Offshore Mechanics Symposium, First, Seoul, Korea, June 24-28, 1990. Proceedings, Vol.1. Edited by J.S. Chung et al, Golden, CO, International Society of Offshore and Polar Engineers, 1990, p.45-50, 18 refs.

DLC TC1665.P34 1990

Antarctic building designers are confronted with minimal research data on wind loads and snowdrifting around buildings and structures. This paper seeks to address this deficiency. The design feature affecting the performance of antarctic buildings in terms of snowdrift clearance and design loading appears to be the building shape facing the wind and the elevation of the building from the ground. The wind-induced loads on and snowdrifting formation around a number of different shapes of on-ground and elevated buildings were investigated. This research provides vital information for the prediction of snowdrifting around antarctic buildings and will play a major role in antarctic building design in the future. (Auth. mod.)

G-46142

Mitsuhashi, H., **Study on prediction of snowdrift around buildings in Antarctica,** Pacific/Asia Offshore Mechanics Symposium, First, Seoul, Korea, June 24-28, 1990. Proceedings, Vol.1. Edited by J.S. Chung et al, Golden, CO, International Society of Offshore and Polar Engineers, 1990, p.59-64, 4 refs.

DLC TC1665.P34 1990

In this paper the author describes the wind tunnel experiment of an artificial snowstorm in which model snow is used as one of the means of predicting the patterns of snowdrifts and the quantity of piled up snow around the buildings of an observation base in Antarctica. The reproducibility of this method of experiment is also investigated. Further investigations consider the fundamental properties of snowdrifts, and their relation to effective height parameters for elevated buildings. Also reported is an example of application of this experiment to the prediction of snowdrifts around buildings planned for construction in Antarctica. (Auth. mod.)

G-46143
Rieck, I., Radford, W., **Benefit and use of phase change thermal storage in buildings in the antarctic environment,** Pacific/Asia Offshore Mechanics Symposium, First, Seoul, Korea, June 24-28, 1990. Proceedings, Vol.1. Edited by J.S. Chung et al, Golden, CO, International Society of Offshore and Polar Engineers, 1990, p.65-71, 5 refs.
DLC TC1665.P34 1990

This paper discusses the use of new phase change materials (PCMs) in high density thermal storage as modular 'heat banks' in the antarctic infrastructure, to assist energy management and significantly reduce energy consumption. These new heat banks provide cost effective means to collect and store waste, rejected and off-peak energy for recycling later during the peak-demand period, to provide 'free' space heating, hot water, or process heat, and allow significant reduction in the size of plant and equipment such as generators, heat pumps, boilers etc. This paper also deals with other techniques utilizing PCMs to provide automatic passive systems to protect personnel and/or electronic equipment in the event of adverse high or low temperature excursions, due to malfunction of other environment control equipment. (Auth. mod.)

G-46176
Tatinclaux, J.C., **Tests in ice on an antarctic research vessel model,** *U.S. Army Cold Regions Research and Engineering Laboratory. Special report,* SR 92-03, Feb. 1992 41p., ADA-249 789, 6 refs.

A new antarctic research vessel to be chartered by the National Science Foundation was designed and is under construction by North American Shipbuilding, Inc., Larose, LA. A full model test program was required by NSF to verify that the proposed design would meet the vessel operational requirements. In particular, the ship is to break 3 ft (0.9 m) of ice at 3 kn (1.5 m/s) continuously and break through pressure ridges with a 6 ft (1.8 m) sail and a 20 ft (6.1 m) keel. Ice model tests were made in CRREL's ice towing tank. The test program included resistance and propulsion tests in level ice, tests in ridges and ramming tests in ice floes of up to 6 ft (1.83 m) in thickness. The test results described in the report indicate that the proposed ship design with 8.8 MW of power available at the propeller would meet or exceed all operational requirements in ice. The power needed to operate continuously in 3 ft first year level ice at 3 kn was estimated at 6.5 MW; the vessel was found to be able to ram through a 38 ft (11 m) keel ridge; finally, when ramming in 6 ft thick level ice at an impact speed of 6 kn (3.1 m/s) at full power, the vessel was predicted to penetrate by about one-third of a ship length into the ice. (Auth.)

G-46307
Newest antarctic research vessel passes mid-point in construction, *Sea technology,* June 1991 32(6), p.49-51.

This paper describes the performance capabilities of the *Nathaniel B. Palmer,* a research vessel currently under construction, planned for delivery to the National Science Foundation in Jan., 1992. The ship, with icebreaking capabilities, is destined for deployment in Antarctica to facilitate the Foundations's Antarctic Research Program.

G-46414
Monastersky, R., **Inferno revisited,** *Science news,* Jun. 6, 1992 141(23), p.376-378.

Described here is a planned descent into the inner crater of the volcano on Mount Erebus. Applied robotics technology is being used to assemble and equip a robot with sensors to record and transmit data observed in the core. The eight legged robot, known as Dante, to be carried the last 2 km up Erebus by a transporter called Virgil, will make the descent tethered to Virgil. Dante, guided by the human team, will then make a directed exploration of the volcano, record and transmit the data, and return to Virgil. The short antarctic field season and the one-time $2 million appropriation to NASA for this project require that the Dante-Virgil team be ready to move by Oct., 1992.

G-46495
SCAR Panel of Experts on Waste Disposal, Bleasel, J.E., Bonner, W.N., Bolin, B., Knox, G.A., **Waste disposal in the Antarctic,** Kingston, Tasmania, 1989, 53p., 13 refs.

Responses to questionnaires on waste disposal from antarctic permanent stations and temporary camps in 1986 and 1987 are summarized. Types of waste included sewage, solid, and chemical wastes. Methods of disposal included removal from the area, open burning, burial in landfills or ice pits, or dumping at sea. It is recommended that wastes be incinerated when this can be done without danger to the environment or health, or if not safe, then removed from the Antarctic Treaty area.

G-46500
Barthelemy, J.L., **Nomographs for operating wheeled aircraft on sea-ice runways: McMurdo Station, Antarctica,** International Conference on Offshore Mechanics and Arctic Engineering, 11th, Calgary, Alberta, June 7-12, 1992. Proceedings. Vol.4. Edited by O.A. Ayorinde, N.K. Sinha, D.S. Sodhi, and W.A. Nixon, New York, American Society of Mechanical Engineers, 1992, p.27-33, 10 refs.

The Naval Civil Engineering Laboratory provides criteria to the National Science Foundation for the safe operation of aircraft on seasonal sea-ice runways in Antarctica. Historically, landing curves were developed for specified aircraft only; however, as heavier airplanes are introduced, as craft are flown later into the season, as traffic from foreign countries multiplies, and as the possibility of commercially motivated tours increases, it becomes important to develop more rigorous standards. Recently, some useful correlations for approximating landing stresses and parking deflections were developed from the computer program VISICE, a finite-element model that predicts both the elastic and linear viscoelastic responses of a loaded ice sheet. In this paper, the technique is extended to reformat the landing and parking curves as nomographs that demonstrate more clearly the relationships between ice thickness, gross aircraft weight, surface temperature and wheel configuration. (Auth.)

G-46521
Reed, M.R., Morgan, M., Forman, K., **U.S. Naval Support Force, Antarctica: McMurdo Station operations, 1989-1990,** *Antarctic journal of the United States,* 1990 25(5), p.292-294.

Operating the United States Antarctic Program each season is a complex task, demanding a constant supply of material and human resources. The parent U.S. military contingent, U.S. Naval Support Force, Antarctica (NSFA), is organized into nine departments (administration, communications, operations, supply, public works, medical, terminal operations, morale/welfare/recreation, and safety/-training) to ensure that the objectives of the program are met. This article outlines the responsibilities of each NSFA department and highlights some of the events from the 1989-1990 field season.

G-46522
Reed, M.R., Floro, C.V.O., **U.S. Naval Support Force, Antarctica: detachment operations, 1989-1990,** *Antarctic journal of the United States,* 1990 25(5), p.295-296.

Naval Support Force, Antarctica (NSFA) carries out its mission from four locations. During the austral summer, the main body of NSFA personnel deploys to McMurdo Station. Two other detachments provide technical and logistical support for the U.S. Antarctic

Program: the unit's homeport headquarters at Port Hueneme, CA, and a logistic staging area at Christchurch, New Zealand. During the winter of Operation DEEP FREEZE 1990, Detachment McMurdo upgraded several buildings, including alterations to the Officer's Club, CNSFA Headquarters, and the MARS Building. New flooring was placed in the fuels barn and the gymnasium floor was resurfaced. Outside projects included: packing the snow road at Williams Field for the mid-winter airdrop, installing new approach and perimeter markers for the sea-ice runway to provide better visibility for pilots (especially during the twilight WINFLY season), and finishing temporary lighting and core sampling for the newly constructed ice pier.

G-46524

Reed, M.R., **U.S. Naval Support Force, Antarctica: ship operations, 1989-1990,** *Antarctic journal of the United States,* 1990 25(5), p.298-299.

One U.S. Coast Guard and two civilian contract ships traveled to McMurdo Station during the 1989-1990 austral summer. The USCGC *Polar Star* (WGAB-10) provided icebreaking support; the M/V *Gus W. Darnell* transported fuel to the station and took on used fuel for return to the United States; and the M/V *Green Wave* brought supplies to the station to meet the needs of the upcoming winter and the next austral summer. Additionally, the National Science Foundation's research ship *Polar Duke* visited McMurdo Station twice during Jan. and Feb. 1990 to take on passengers, fuel, and cargo. The USCGC *Polar Sea* (WGAB-11) remained in Seattle on standby from Jan. 1 to Feb. 15.

G-46525

Trembly, L.A., **U.S. Navy Antarctic Development Squadron Six (VXE-6) activities, 1989-1990,** *Antarctic journal of the United States,* 1990 25(5), p.300-301.

The Antarctic Development Squadron Six (VXE-6) provides the regular intracontinental air support for the U.S. Antarctic Program (USAP). The squadron also supplements other forms of air and sea support for cargo and passenger movements between Christchurch, New Zealand, and McMurdo Station. VXE-6 personnel deploy each year to Antarctica between the months of Oct. and Mar., the time when Antarctica experiences continuous sunlight. During the months of the antarctic winter, VXE-6 prepares for the upcoming austral summer and trains flight crews and maintenance personnel at the Naval Air Station in Point Mugu, CA, the squadron's home base. Winter fly-in (winfly) provides McMurdo Station with personnel and materials necessary for the opening of the austral summer season in Oct. During the 1989-1990 austral summer, VXE-6 LC-130 and UH-IN pilots and crews flew 4,917.6 hours, transported 6,316,624 pounds of mail, cargo and fuel, and carried 3,838 passengers.

G-46672

Kim, D.H., Kwok, K.C.S., Rohde, H.F., **Wind tunnel study of wind loads on and snowdrift around the buildings for antarctic use,** *Sydney University, Australia. School of Civil and Mining Engineering. Research report,* Apr. 1990 R-614, 14p. + appends., PB90-259326, 18 refs.

The design features affecting the performance of antarctic buildings in terms of snowdrift clearance and design loading appear to be the building shape facing the wind and the elevation of the building from the ground. The wind induced loads on and snowdrifting formation around a number of different shapes of on-ground and elevated buildings were investigated. It is recommended that buildings have chamfered corners and be raised above ground as high as practicable, and the entrance not be facing the wind. (Auth. mod.)

G-46673

Kim, D.H., Kwok, K.C.S., Rohde, H.F., **Wind tunnel test of wind loads on various shapes of elevated buildings for antarctic use,** *Sydney University, Australia. School of Civil and Mining Engineering. Research report,* Mar. 1990 R-608, 40p., PB90-259318, 18 refs. For another version see 46-3023 or G- 45970.

Wind loads on elevated modular buildings in Antarctica were simulated on 1/50-scale models in the Boundary Layer Wind Tunnel at the School of Civil and Mining Engineering, Sydney University, Australia. The modular building system is based on the dimensions of a shipping container, 6 x 3.6 x 4 m. Models with chamfered and rounded corners show a reduction in wind force over a simple rectangular shape. (Auth. mod.)

G-46703

Horn, N., Arellano, H., **Site of the Ecuadorian antarctic station** [El sitio de instalación de la estación científica Ecuatoriana en la Antártida], *Acta antártica ecuatoriana,* 1990 Vol.1, p.91-99, In Spanish with English summary. 14 refs.

Canto Point on Greenwich I. was the site selected by the Ecuadorian Antarctic Program (PROANTEC) for the installation of Pedro Vicente Maldonado Station, the project originating in the Ecuadorian government's decision to incorporate the antarctic region into the national scientific research program. The station, of a modular type, is located on a flat platform at 20 m of altitude, consisting of glaciomarine unconsolidated sediments. The area, sheltered from dominant strong easterly winds, has access through the Guayaquil Cove, between Orion Point and Quito Glacier. Canto Point and vicinity are considered to be an adequate location for investigations in geosciences, biosciences, atmospheric sciences and logistics. (Auth. mod.)

G-46726

Australian National Antarctic Research Expeditions, Potter, S.A., ed, **ANARE antarctic field manual, 4th ed,** Kingston, Tasmania, 1992, 198p.

This manual describes procedures and equipment for avoiding or surviving life threatening hazards in antarctic field work. A list and brief description of Australian stations and bases in Antarctica is provided. Instructions are included for travel on land or sea ice by foot, ski, sled, small and heavy vehicles, helicopter and fixed wing aircraft, and small boats; for provision of clothing, shelter, and rations; for navigation and radio communications; for what to do if lost on land or stranded on ice floes; for aircraft and boating emergencies; and for rescue of personnel and vehicles from crevasses or thin ice.

G-46730

Swithinbank, C., **Non-government aircraft in the Antarctic 1991/92,** *Polar record,* July 1992 28(166), p.232.

A brief note provides an accounting of privately owned aircraft used in support operations in Antarctica. These include tour groups, film companies' photographic expeditions, and even a Japanese motorcycle expedition to Amundsen-Scott Station.

G-46775

Swithinbank, C., **Potential airfield sites in Antarctica for wheeled aircraft,** *U.S. Army Cold Regions Research and Engineering Laboratory. Special report,* SR 91-24, Dec. 1991 68p., ADA-249 503, 16 refs.

This is a report on a search for possible or potential airfield sites in Antarctica, using aerial photographs and satellite images supplemented by other data. A few sites are on ice-free ground but the majority are on inland blue ice fields. Earlier studies of potential airfields on antarctic glacier ice are referenced. The attraction of a well-chosen blue-ice runway is that construction and maintenance costs are almost nil. A number of sites have been found suitable for the operation of unmodified transport aircraft on wheels. An inland icefield site on Mill Glacier is in use for wheel landings by LC- 130 aircraft; another at Patriot Hills is in use for wheel landings by DC-6 aircraft. (Auth.)

G-46898

U.S. Naval Support Force Antarctica, **Final report of Operation Deep Freeze '92 (1991-1992),** 1992, var. p.

This report describes the military support provided to the National Science Foundation in conjunction with the U.S. Antarctic Program from Aug. 1991 to Mar. 1992 as Operation Deep Freeze 91/92. This included providing the fundamental life support requirements of food and medical services to McMurdo Station residents and the logistic pipeline for resupply of McMurdo, South Pole and Byrd Surface Camp, plus support of Scott Base, the nearby New Zealand station. Inherent in the support requirements is the objective of safe operations. A chronological summary of significant events during the operating period is given. The various organizations, units and commands participating in Operation Deep Freeze 91/92 are listed, and their activities are described in sufficient detail to provide guidance for following years.

G-47014

Kaminuma, K., **U.S. Palmer Station in Antarctica,** *Polar news,* Mar. 1991 No.52, p.3-6, In Japanese. 1 ref.

A general description is given of the U.S. Palmer Station on Anvers I. about 40 km off the Antarctic Peninsula and of its companion research vessel, the *Polar Duke,* chartered by the U.S. National Science Foundation, with a 14-man crew and 26 researchers. Though Palmer Station, housing a maximum of 44 people with a permanent staff of 20-40 in the summer and 6-12 in the winter, is the smallest of the U.S. stations in Antarctica, it is one of the most important for biological research. It has a 1000 sq ft aquarium to hold live specimens. Other research includes facilities for VLF observations of the upper atmosphere, and ozone observations. Tourism began in the summer of 1987-88 with about 1300 visitors that year and the number has been increasing every year since.

G-47015

Nishio, F., **Sketch on West Germany antarctic station,** *Polar news,* Mar. 1991 No.52, p.14-21, In Japanese.

A general description is given of Georg von Neumayer Station, the first permanent German station in Antarctica, established in Feb. 1981. Construction of the second Georg von Neumayer Station is scheduled for summer 1991/92. A brief but emotional account is given of the reception at the station of the news of the fall of the Berlin Wall in 1989. Also included are brief descriptions of the German summer stations: Filchner, Drescher, Lilli Marlene, and Gondwana, and of the German icebreaking research vessel, *Polarstern,* with a list of its cruises from Aug. 1989 to May 1991. The first all-woman overwintering team of nine members stayed at Neumayer Station in 1990/91. It is suggested that mixed teams are better.

G-47147

Antarctic Support Associates, **Field manual for the U.S. Antarctic Program,** Englewood, CO, 1992, 207p.

Procedures and equipment for field trips from McMurdo Station are described. Information is provided on supplies issued such as clothing, food, radios, and stoves; helicopter and LC-130 put-in and safety procedures; snow shelter making and tent set-up; waste disposal; snowmobile troubleshooting; roped travel with snowmobile and sleds in crevassed areas; and crevasse rescue. A list of emergency cache and hut locations is also included.

G-47168

Pearson, M., **Expedition huts in Antarctica: 1899-1917,** *Polar record,* Oct. 1992 28(167), p.261-276, 49 refs.

During the 'Heroic Era' of antarctic exploration, which lasted from 1895 to 1917, nine huts were erected in Antarctica, three of Scandinavian design, three British, and three Australian. Although all of the huts were specially designed to house expedition personnel, each group drew on different precedents, regional architectural influences, and degrees of conscious innovation for polar conditions. Of particular note was the use of different insulation materials, some of which were traditional and some of which were new or experimental. This paper looks at the details of design and construction of each hut, and at the factors that might have contributed to the success or failure of a particular hut. These factors included the theoretical thermal efficiency of the design and the construction materials, the effectiveness of the heating and ventilation systems installed, and the amount of floor space available to each man. It is concluded that efficiency depended on a combination of these factors rather than on any one, and that the 'Heroic Era' was probably too short a period of time for the best combination (if one existed) to be recognized and adopted to produce a consistently efficient antarctic hut design. (Auth.)

G-47235

Eraso, A., Sánchez de Toro Larios, A., Fernandez Rubio, R., Presa Santos, J., **Plans for the construction of a dam in a fossil lagoon near the Juan Carlos I Station** [Anteproyecto de construcción de un azud en la albufera fósil del sexto nivel de playa existente junto a la Base Antártica Española Juan Carlos I. Isla Livingston (Shetland del Sur)], Spain. Proyecto Español de Glaciología Antártica. Contribución a la Campaña Antártica 88/89. Primeros resultados. (Contribution to the Antarctic Expedition 1988-1989. First results), [Madrid], E.T.S.I. Minas: Universidad Politecnica de Madrid, [1989], p.89-101, In Spanish with English summary. 5 refs.

DLC GB2597.C86

A plan is described, based on a 1:500 scale topographic survey of the fossil lagoon above the 6th beach level where the Juan Carlos I Station is located, for the construction of a small dam of loose materials and the subsequent restoration of the lagoon to its natural conditions. It is estimated that the resulting reservoir could contain at least 15,000 cu m of water, the logistic advantages of which are pointed out, both to the nearby Station which could remain operative over winter, as well as to cargo operations in future expeditions. Estimates of the cost are also presented. (Auth. mod.)

G-47355

Barthelemy, J.L., **Landing and parking a C5 Galaxy on sea ice: McMurdo Station, Antarctica,** International Conference on Ice Technology, 3rd, Cambridge, MA, Aug. 11-13, 1992. Proceedings. Edited by T.K.S. Murthy, W.M. Sackinger and P. Wadhams, Southampton, England, Computational Mechanics Publications, 1992, p.37-49, 10 refs.

The Naval Civil Engineering Laboratory was tasked in 1989 to verify the feasibility of using a C5 Galaxy, the world's largest cargo aircraft, to boost the United States Antarctic Program during its yearly resupply effort. The finite-element computer program VISICE was employed to develop landing and parking curves for the annual sea-ice runway located each season near McMurdo Station. As a result of that effort, a fully-loaded C5B made an unprecedented safe landing and takeoff in Oct. 1989. (Auth.)

See also:
A-45088 A-45459 A-45613 A-45882 A-46460 B-45095
B-45931 B-46580 B-46762 B-46836 B-47334 B-47336 E-46902
F-45063 F-45376 F-46105 F-46493 F-47340 H-45335 H-45336
H-45867 H-46072 I-45338 I-45640 I-45648 I-45689 I-46091
I-46523 I-46780 K-45136 K-47264 L-45804

H. MEDICAL SCIENCES

H-45130
Flores, A.L., Teha, E.C., **Human work adaptation to antarctic rough weather** [Condiciones de trabajo humano a la intemperie en zonas antárticas], Actas de la Primera Conferencia Latinoamericana sobre Geofísica, Geodesia e Investigación Espacial Antárticas. (First Latin American Conference on Antarctic Geophysics, Geodesy and Space Research, Buenos Aires, July 30-Aug. 3, 1990. Proceedings.) Edited by A. Louro, M.A. Van Zele, and I. Velasco, ⌈Buenos Aires, Centro Latinoamericano de Física, 1990⌉, p.190-195, In Spanish. 3 refs.

A study of low temperature effects on human activity was carried out under different meteorological conditions, with special emphasis on the wind chill factor. Tables showing 3 danger zones to human health— small, 41%; growing, 53%; and severe, 6%—correlated with air temperature and wind velocity, are presented and analyzed.

H-45184
Takami, S., Sakamoto, T., **Mental and physical changes of wintering members of the 30th Japanese Antarctic Research Expedition in 1988-1990,** *Antarctic record,* July 1991 35(2), p.247-261, In Japanese with English summary. 12 refs.

Medical and psychological investigations were performed on JARE-30 wintering members throughout one year. Psychosomatic investigation consisted of CMI, Y-G and Egogram. Physiological investigation consisted of standard 12-induction electrocardiogram, holter long-time electrocardiogram, blood pressure, hematological and biochemical studies, and serum cortisol level. Although no significant disease was experienced throughout the wintering period, various mental and physical complaints were observed. A depressive tendency and decrease of positiveness were seen in the midwinter period. With holter long-time electrocardiogram recordings, the disappearance of the circadian rhythms of heart rate was observed. An elevation of serum cortisol level was observed which suggests the existence of stress-irritation. Serum total protein, serum albumin, hematocrit and hemoglobin decreased during the wintering period. Other examinations on electrocardiogram, blood pressure, hematological and biochemical studies revealed no significant changes. (Auth.)

H-45270
Harrison, A.A., ed, Clearwater, Y.A., ed, McKay, C.P., ed, **From Antarctica to outer space: life in isolation and confinement,** New York, Springer-Verlag, [1990], 410p., Refs. passim. For individual papers see A-45303, G-45283, H-45271 through H-45282, H-45284 through H-45300, M-45301 and M-45302.

DLC Q180.55.P75F76

This volume, divided into four parts, is based on papers presented at The Human Experience in Antarctica: Applications to Life in Space conference, Sunnyvale, CA, August 1987. Part 1, Settings, provides through firsthand accounts and research reviews an introduction to the human side of isolated and confined environments, including Antarctica, outer space, submarines, and remote national parks. Part 2, Orientations and Perspectives, discusses some of the theoretical issues underlying research on isolated and confined people and shows the applicability of certain general theories of behavior. Part 3, Isolation and Confinement Effects, focuses on basic psychological and social responses to isolation and confinement. Part 4, Interventions and Outcomes, describes studies whose primary purpose is to explore the effects of selection, training, and environmental design on human behavior and mission outcomes. Finally, in the Conclusion, the editors present recommendations based on the Sunnyvale Conference and on other developments.

H-45271
Cornelius, P.E., **Life in Antarctica,** From Antarctica to outer space: life in isolation and confinement, edited by A.A. Harrison, Y.A. Clearwater and C.P. McKay, New York, Springer-Verlag, [1990], p.9-14.

DLC Q180.55.P75F76

This chapter provides a detailed description of life on antarctic stations. Behavioral issues are identified that are of particular interest to operational personnel, and practices are described that can either build or destroy rapport among station members, especially under the stresses during isolation periods.

H-45272
Levesque, M., **Experiential perspective on conducting social and behavioral research at antarctic research stations,** From Antarctica to outer space: life in isolation and confinement, edited by A.A. Harrison, Y.A. Clearwater and C.P. McKay, New York, Springer-Verlag, [1990], p.15-20, 7 refs.

DLC Q180.55.P75F76

Referring to results of earlier studies in which the Amundsen-Scott Station was used as the site for extensive social and behavioral research, and drawing from his personal experience of work and life in Antarctica, the author concurs that people who have wintered over in Antarctica have much to share with those who will be spending long periods of time in space. The importance of physical, psychological, social and cultural adaptations to hostile, confined and isolated conditions is examined, and the most pressing areas in need of further practical research, including crew selection, are outlined.

H-45273
Barabasz, A.F., **Review of antarctic behavioral research,** From Antarctica to outer space: life in isolation and confinement, edited by A.A. Harrison, Y.A. Clearwater and C.P. McKay, New York, Springer-Verlag, [1990], p.21-30, Refs. p.28-30.

DLC Q180.55.P75F76

Early and recent behavioral studies, including systematic psychological studies of antarctic personnel and screening studies, are reviewed. Findings, such as that exposure to antarctic isolation may produce alterations in consciousness, are examined with the conclusion that these phenomena have the potential to facilitate, degrade, or endanger adaptation to antarctic living and, by analogy, to life in space. Controlled studies of hypnotizability, individual adaptation and absorption in Antarctica are recommended.

H-45274
Lugg, D.J., **Current international human factors research in Antarctica,** From Antarctica to outer space: life in isolation and confinement, edited by A.A. Harrison, Y.A. Clearwater and C.P. McKay, New York, Springer-Verlag, [1990], p.31-42, Refs. p.40-42.

DLC Q180.55.P75F76

The history of the interest in the psychology of polar exploration is reviewed. Coverage includes excerpts from human studies on early antarctic expeditions drawing attention to mental health problems in Antarctica; the first international gathering specifically on the special needs of humans in polar regions, held in 1962; the organization of the International Biomedical Expedition to the Antarctic in 1980-1981, and the current international network for Antarctic and polar human studies, which is also shown in a chart. A table is presented summarizing the 1985-1987 national programs for multidisciplinary research on the interaction of man with the antarctic environment, as well as a chart outlining the current Australian antarctic human research program.

H-45275

Taylor, A.J.W., **Research program of the International Biomedical Expedition to the Antarctic (IBEA) and its implications for research in outer space,** From Antarctica to outer space: life in isolation and confinement, edited by A.A. Harrison, Y.A. Clearwater and C.P. McKay, New York, Springer-Verlag, [1990], p.43-55, Refs. p.54-55.

DLC Q180.55.P75F76

The focus of this chapter is on the latest and most comprehensive biomedical study that has ever been conducted in Antarctica, the International Biomedical Expedition to the Antarctic, organized in 1977 and carried out in the summer of 1980-1981. Three general aims of the study are discussed: to determine the extent of human physiological adjustment to cold, to measure the effects of cold and isolation on physical and mental performance, and to study interpersonal relationships under stressful conditions. The subjects, research expectations and stress parameters are described. Analysis of results points to the problems that can arise from overdemanding researchers and overdemanding research schedules. Guidelines are offered, some applying to the training of personnel and the arranging of research programs, which could help avoid some of the problems.

H-45276

Blair, S.M., **Antarctic experience,** From Antarctica to outer space: life in isolation and confinement, edited by A.A. Harrison, Y.A. Clearwater and C.P. McKay, New York, Springer-Verlag, [1990], p.57-64.

DLC Q180.55.P75F76

The experience with existing contained environments, particularly the well-documented experience with wintering over in the isolation, cold and dark of Antarctica, is reviewed. This chapter is concerned with identifying types of human dysfunctions occurring in contained environments, with finding and suggesting reasons why these dysfunctions occur, and with examining ways in which dysfunctions can be prevented or corrected.

H-45277

Harris, P.R., **Personnel deployment systems: managing people in polar and outer space settings,** From Antarctica to outer space: life in isolation and confinement, edited by A.A. Harrison, Y.A. Clearwater and C.P. McKay, New York, Springer-Verlag, [1990], p.65-80, Refs. p.79-80.

DLC Q180.55.P75F76

To evaluate personnel for long term missions in Antarctica or aboard a space station, the space personnel deployment strategies guidelines to follow include the "who, what, how and why" type of approach. Antarctica is found to be an ideal ground-based location to experiment with deployment issues, with establishing new cultural outposts for humanity, and with the macromanagement of such large-scale enterprises. Such knowledge can then be applied in space voyaging and settlement.

H-45278

Douglas, W.K., **Psychological and sociological aspects of manned spaceflight,** From Antarctica to outer space: life in isolation and confinement, edited by A.A. Harrison, Y.A. Clearwater and C.P. McKay, New York, Springer-Verlag, [1990], p.81-87, 11 refs.

DLC Q180.55.P75F76

Several works are reviewed dealing with behavioral issues associated with isolation and confinement similar to the conditions in Antarctica. An analysis of the causes of the problems reveals that insufficient attention had been paid to the selection of personnel and to their individual and group psychological needs.

H-45279

Weybrew, B.B., **Three decades of nuclear submarine research: implications for space and antarctic research,** From Antarctica to outer space: life in isolation and confinement, edited by A.A. Harrison, Y.A. Clearwater and C.P. McKay, New York, Springer-Verlag, [1990], p.103-114, 8 refs.

DLC Q180.55.P75F76

An overview of 3 decades of nuclear submarine research, including psychiatric screening, crew training and development, crew composition and adjustment, human factors and stress, is presented with intent to provide some useful hints on variables to be included in future space and antarctic research. In conclusion, the salient research issues are listed as follows: atmospheric revitalization and contaminant control; development and validation of procedures for the medical and psychological screening of recruits; identification of techniques for initiating and sustaining individual motivation and group morale; and stressor identification, assessment of the severity of POSR (Patterns of Stress Reactivity), and development of effective stress coping strategies.

H-45280

Valen, R.J., Caldwell, B.S., **National Park Service areas as analogues for antarctic and space environments,** From Antarctica to outer space: life in isolation and confinement, edited by A.A. Harrison, Y.A. Clearwater and C.P. McKay, New York, Springer-Verlag, [1990], p.115-121, 9 refs.

DLC Q180.55.P75F76

It is proposed that isolated national parks are useful sites for studying human behavior. Although national parks may not be "high-fidelity" analogues for Antarctica or outer space, many are located substantial distances from full-amenity communities and are effectively cut off from the outside during the winter. Rangers are similar to astronauts in that they are physically and mentally healthy individuals who have a long-term career commitment. Additionally, because it is possible to find parks of almost any size in urban, suburban, and rural settings, it is relatively easy to make controlled comparisons of isolated and non-isolated groups.

H-45281

Pierce, C.M., **Theoretical approaches to adaptation to Antarctica and space,** From Antarctica to outer space: life in isolation and confinement, edited by A.A. Harrison, Y.A. Clearwater and C.P. McKay, New York, Springer-Verlag, [1990], p.125-133, 5 refs.

DLC Q180.55.P75F76

On the basis of psycho-biosocial studies in the Antarctic, an organizational framework is presented for addressing the analogies between space-flight and antarctic environments, including time lines and research opportunities, as well as environmental and behavioral similarities. The concept of "microaggression" is introduced: small acts that are almost innocuous in themselves but that, in the aggregate, can undermine self-esteem and destroy interpersonal relationships.

H-45282
Suedfeld, P., **Groups in isolation and confinement: environments and experiences,** From Antarctica to outer space: life in isolation and confinement, edited by A.A. Harrison, Y.A. Clearwater and C.P. McKay, New York, Springer-Verlag, [1990], p.135-146, Refs. p.144-146.
DLC Q180.55.P75F76

On the premise that responses to environments, including isolated and confined ones, reflect an interaction between the environment and the person, 5 principles to help guide inferential thinking and research are offered, and specific personality variables that are likely to moderate a person's experience of isolation and confinement are identified. The organizing principles are as follows: that researchers should think in terms of experiences within environments, rather than of environmental characteristics; researchers should study differences and similarities between experiences, which are not the same as those between environments; analogies should be based on similarities of experience, not necessarily of environments; research should look at systematic links between personality factors and experience; and experience is continuous and integrated, rather than discontinuous and fragmented.

H-45284
Brady, J.V., Anderson, M.A., **Small groups and confined microsocieties,** From Antarctica to outer space: life in isolation and confinement, edited by A.A. Harrison, Y.A. Clearwater and C.P. McKay, New York, Springer-Verlag, [1990], p.161-176, Refs. p.175-176.
DLC Q180.55.P75F76

It is argued that systematic, carefully controlled experimental studies provide the most promising methods for managing the performance and welfare of isolated and confined groups. The roots of this technology are to be found in programmed environments simulating space or antarctic stations, and that allow the application of behavior modification principles to enhance productivity, morale, and social compatibility. A long-term program of experimental programmed environment research conducted by the authors is described.

H-45285
Miller, J.G., **Applications of living systems theory to life in space,** From Antarctica to outer space: life in isolation and confinement, edited by A.A. Harrison, Y.A. Clearwater and C.P. McKay, New York, Springer-Verlag, [1990], p.177-197, Refs. p.196-197.
DLC Q180.55.P75F76

It is argued that Antarctica may be the best place within Earth's gravity field to analyze the problems of life in space, and even to put a space station simulator or to model a lunar outpost. Antarctica is also considered to be a good place to develop plans for continuous monitoring of human behavior under rigorous conditions, by procedures such as those based on living systems theory. This theory provides a framework for the description and analysis of biological and social systems. According to the theory, there are certain important similarities and parallels among systems at all levels, including, but not limited to, the individual, group, organizational, community, and societal levels.

H-45286
Barabasz, A.F., **Effects of isolation on states of consciousness,** From Antarctica to outer space: life in isolation and confinement, edited by A.A. Harrison, Y.A. Clearwater and C.P. McKay, New York, Springer-Verlag, [1990], p.201-208, Refs. p.206-208.
DLC Q180.55.P75F76

One of the earliest behavioral findings in Antarctica was Mullin's discovery of spontaneous trance states. The author describes these states and Mullin's and subsequent studies, showing how isolation and confinement can produce significant and sometimes quite dramatic alterations in consciousness as measured by standardized instruments, including tests of hypnotizability.

H-45287
Barabasz, M., **Imaginative involvement in Antarctica: applications to life in space,** From Antarctica to outer space: life in isolation and confinement, edited by A.A. Harrison, Y.A. Clearwater and C.P. McKay, New York, Springer-Verlag, [1990], p.209-215, 14 refs.
DLC Q180.55.P75F76

This chapter focuses on preliminary data obtained from two antarctic pilot investigations. Results appear to support the view that subjects exposed to either short or long term antarctic living conditions demonstrate unique adaptations, such as increases in mental absorption (imperviousness to distracting events) and imaginative involvement (the ability to get involved in fantasy).

H-45288
Oliver, D.C., **Psychological effects of isolation and confinement of a winter-over group at McMurdo Station, Antarctica,** From Antarctica to outer space: life in isolation and confinement, edited by A.A. Harrison, Y.A. Clearwater and C.P. McKay, New York, Springer-Verlag, [1990], p.217-227, Refs. p.225-227.
DLC Q180.55.P75F76

The positive and negative psychological changes were studied in an antarctic winter-over group using a variety of psychological techniques, including standardized tests, questionnaires, interviews, and personal observations. Unlike most previous studies, the current study shows significant positive psychological changes in winter-over participants that may be as important as the better known negative problems of isolation and confinement. Two standardized psychological tests showed a decrease in pathology and an increase in self-actualization during the winter, and many participants subsequently described wintering-over as one of the best experiences of their lives.

H-45289
Carrère, S., Evans, G.W., Stokols, D., **Winter-over stress: physiological and psychological adaptation to an antarctic isolated and confined environment,** From Antarctica to outer space: life in isolation and confinement, edited by A.A. Harrison, Y.A. Clearwater and C.P. McKay, New York, Springer-Verlag, [1990], p.229-237, 19 refs.
DLC Q180.55.P75F76

The preliminary results of a longitudinal study of stress in Antarctica are presented. Both the chronic qualities of the environment, such as wind speed, and acute social and environmental events, such as the arrival of the summer crew, were related to physiological and psychological measures throughout the winter. Results suggest that Antarctica is not simply a static source of stress but a dynamic environment whose impact varies from individual to individual.

H-45290
Palinkas, L.A., **Group adaptation and individual adjustment in Antarctica: a summary of recent research,** From Antarctica to outer space: life in isolation and confinement, edited by A.A. Harrison, Y.A. Clearwater and C.P. McKay, New York, Springer-Verlag, [1990], p.239-251, Refs. p.249-251.
DLC Q180.55.P75F76

A series of studies that examined the health and service records of enlisted Navy personnel who took part in the Operation Deep Freeze program are summarized. The salient themes of this research are its relevance for the space program, its interdisciplinary nature, and the need for developing a comprehensive program of additional behavioral and social research in the Antarctic. Results indicate that the overall illness rate for the winter-over group was significantly lower than that of the control group.

H-45291
Hampton, I.F.G., Goldsmith, R., **International Biomedical Expedition to the Antarctic: physiological studies in the field,** From Antarctica to outer space: life in isolation and confinement, edited by A.A. Harrison, Y.A. Clearwater and C.P. McKay, New York, Springer-Verlag, [1990], p.253-260, 5 refs.

DLC Q180.55.P75F76

The physiology program was designed with several objectives: first, to characterize the expedition members in terms of their responses to various mixed stimuli, such as heat, cold, and exercise, to aid comparison with the subjects of other studies; second, in the event that adaptations would occur as a result of exposure to the antarctic environment, to try to measure some of the effective stimuli that produced them; and third, to test whether adaptive changes could be detected and to examine whether the procedure of artificial acclimation had conferred any benefits. This chapter describes the second of these, reviewing the climatological background to the studies and the physiological stimuli and responses produced, with the exception of effects due predominantly to altitude. Results showed the environment to be taxing in all the areas of investigation, but preacclimatization did not appear to confer benefits in terms of the effective stimuli induced.

H-45292
Bechtel, R.B., Berning, A., **Third-quarter phenomenon: do people experience discomfort after stress has passed,** From Antarctica to outer space: life in isolation and confinement, edited by A.A. Harrison, Y.A. Clearwater and C.P. McKay, New York, Springer-Verlag, [1990], p.261-265, 14 refs.

DLC Q180.55.P75F76

A short review of research in isolated environments shows a tendency for negative emotions and behavior to peak during the third quarter of the sojourn. It is suggested that this is a more general phenomenon than was previously supposed; several hypotheses that may account for this effect are identified and discussed. It is pointed out that if one knows when the phenomenon is likely to occur, one can plan for it in both social programming and design considerations. Supporting data from antarctic expeditions are cited.

H-45293
Rivolier, J., Cazes, G., McCormick, I., **International Biomedical Expedition to the Antarctic: psychological evaluations of the field party,** From Antarctica to outer space: life in isolation and confinement, edited by A.A. Harrison, Y.A. Clearwater and C.P. McKay, New York, Springer-Verlag, [1990], p.283-290.

DLC Q180.55.P75F76

Psychological studies of IBEA participants were conducted to test the efficacy of various methods of psychological assessment and to explore the effects of field conditions on psychological functioning. The research design was longitudinal and involved testing before, during, and after the expedition. Through this research, it was hoped to identify the determinants of adaptation to the antarctic environment; identify new and efficient means for ameliorating the problems that arise in the field; and sharpen selection procedures for future space missions. On the whole, the quantitative data suggest that the subjects did well during the field expedition. There was, however, considerable scattering of scores, and the generally positive picture suggested by the standardized tests is tempered by frequent reports of boredom, weariness, homesickness, bad temper, anxiety, and difficulties posed by separation from one's family.

H-45294
Rivolier, J., Bachelard, C., Cazes, G., **Crew selection for an antarctic-based space simulator,** From Antarctica to outer space: life in isolation and confinement, edited by A.A. Harrison, Y.A. Clearwater and C.P. McKay, New York, Springer-Verlag, [1990], p.291-296.

DLC Q180.55.P75F76

This chapter proposes an improved, comprehensive, psychobiological approach to crew selection and training. These procedures are designed for selecting a winter-over crew for an antarctic simulation of a long-duration manned space mission. Possible predictors include measures of cognitive style; attention; emotionality and anxiety; defensiveness; global behaviors; and psychobiological functioning.

H-45295
Natani, K., **Psychophysiology of adaptation and competence; altered states of consciousness during antarctic wintering,** From Antarctica to outer space: life in isolation and confinement, edited by A.A. Harrison, Y.A. Clearwater and C.P. McKay, New York, Springer-Verlag, [1990], p.297-303, Refs. p.302-303.

DLC Q180.55.P75F76

A description is presented of how neurometric measures may be useful for selecting individuals for work in isolated and confined environments. The analysis suggests that exercise of the antigravity muscles may be one key to maintaining the highest levels of cognitive and psychomotor performance.

H-45296
Levine, A.S., **Psychological effects of long-duration space missions and stress amelioration techniques,** From Antarctica to outer space: life in isolation and confinement, edited by A.A. Harrison, Y.A. Clearwater and C.P. McKay, New York, Springer-Verlag, [1990], p.305-315, 15 refs.

DLC Q180.55.P75F76

A description is presented of how long-duration space missions can lead to chronic and episodic stress. Stress amelioration techniques through training in meditation and yoga are discussed. It is suggested that progressive muscle relaxation, biofeedback, and self-hypnosis may be of use on tomorrow's space missions.

H-45297
Clearwater, Y.A., Coss, R.G., **Functional esthetics to enhance well-being in isolated and confined settings,** From Antarctica to outer space: life in isolation and confinement, edited by A.A. Harrison, Y.A. Clearwater and C.P. McKay, New York, Springer-Verlag, [1990], p.331-348, Refs. p.346-348.

DLC Q180.55.P75F76

Experimental work is described which includes the distribution of 285 photographic prints, derived from 35 mm slides examined in a space station mock-up, to Australian crews at Davis and Mawson Stations. The findings demonstrate the potential utility of various esthetic countermeasures to reduce stress, relieve boredom, and enhance the habitability of stimulus-impoverished, confining habitats.

H-45298
Haines, R.F., **Windows: their importance and functions in confining environments,** From Antarctica to outer space: life in isolation and confinement, edited by A.A. Harrison, Y.A. Clearwater and C.P. McKay, New York, Springer-Verlag, [1990], p.349-358, 18 refs.

DLC Q180.55.P75F76

It is argued that windows play a critically important role in making most working and leisure time environments more habitable. It is noted that although windows may be points of structural weakness, they serve so many important psychological and other functions that they still need to be incorporated in outer space and analogous habitats.

H-45299

Klaus, P.N., **Decreasing stress through the introduction of microenvironments,** From Antarctica to outer space: life in isolation and confinement, edited by A.A. Harrison, Y.A. Clearwater and C.P. McKay, New York, Springer-Verlag, [1990], p.359-362, 4 refs.

DLC Q180.55.P75F76

Common reactions in isolated antarctic environments such as the Amundsen-Scott Station are discussed, including depression, irritability, and social tensions. The proposition is made that introducing microenvironments—miniature living representations of landscapes—will have important stress-reducing properties and improve the quality of life in polar and outer space settings.

H-45300

Scott, D., **Keeping the peace in space: a neighborhood model for a community-based, conflict-resolution-oriented justice system,** From Antarctica to outer space: life in isolation and confinement, edited by A.A. Harrison, Y.A. Clearwater and C.P. McKay, New York, Springer-Verlag, [1990], p.363-371, 5 refs.

DLC Q180.55.P75F76

An informal, community-based conflict-resolution system in San Francisco's Visitacion Valley District, which has worked for over a decade to help neighbors live in peace with one another is discussed. Characterized by simplicity, this program, which has inspired similar programs elsewhere, may be easily adapted for "keeping the peace" in Antarctica or outer space.

H-45310

Matusov, A.L., **Results and prospects of medical studies** [Nekotorye itogi i perspektivy meditsinskikh issledovaniĭ], *Problemy arktiki i antarktiki,* 1991 Vol.66, p.141-149, In Russian with English summary. 27 refs.

Results of medical-physiological, psychological, and hygienic studies carried out by the Polar Medicine Laboratory over the last 5 years are summarized. Major statements on future prospects for laboratory studies are formulated, including adaptation and re-adaptation, optimum regimes for expedition activities based on long-term consequences after a few polar winterings, and the improvement of man's protection against extreme conditions at high latitudes. The Laboratory will coordinate with other Soviet polar activities in upcoming studies on human adaptation to the Antarctic. (Auth. mod.)

H-45334

Suedfeld, P., **Polar psychology: an overview,** *Environment and behavior,* Nov. 1991 23(6), p.653-665, 26 refs.

The overview examines the development of this field of medicine and stresses the need for awareness of the physical danger involved, the extremely harsh climate, the isolation, and the disruption of normal social and professional activities in polar regions. All point to the necessity for careful selection and training of those who become involved in this kind of environment. Given these conditions, discussions follow on the role of psychology in polar science, applied polar psychology, and psychology as a basic science. A major goal of the issue is to ensure that environmental psychologists and colleagues in related sciences become more aware of the concerns, history, and opportunities of polar psychology, which may enrich the fields of environmental psychology, human geography, architecture and design, and the social sciences in general.

H-45335

Leon, G.L., **Individual and group process characteristics of polar expedition teams,** *Environment and behavior,* Nov. 1991 23(6), p.723-748 (Pertinent p.723-726 and 742-748), 34 refs.

Empirical investigations of polar expedition teams have assessed psychological characteristics related to adaptive personal and group functioning in a physically challenging, adventurous, and time-limited situation. Group members across studies have demonstrated generally positive personality characteristics, scoring relatively high on achievement motivation and well-being, and relatively low on stress reactivity, anxiety, and depression. Emotional sharing occurred infrequently, and seeking social support was related to relatively poorer psychological functioning in these highly task-focused groups. The psychological problems noted in some "wintering-over" antarctic personnel were not evident in expedition group members. (Auth.)

H-45336

Ursin, H., **Psychobiological studies of individuals in small, isolated groups in the antarctic and space analogues,** *Environment and behavior,* Nov. 1991 23(6), p.766-781 (Pertinent p.766-774 and 778-781), 17 refs.

Mental and physical health are both at risk under conditions of prolonged remoteness from home and removal from normal social support networks. This article examines relevant data from small groups isolated in (a) antarctic summer stations, (b) a Transantarctic traverse expedition, and (c) a spacecraft simulator capsule. (Auth.)

H-45337

Palinkas, L.A., **Effects of physical and social environments on the health and well-being of antarctic winter-over personnel,** *Environment and behavior,* Nov. 1991 23(6), p.782-799, 35 refs.

This article examines the influence of physical and social environmental stressors on the short-term and long-term health and well-being of 358 enlisted U.S. Navy personnel who wintered-over in Antarctica between 1964 and 1974. Station size and severity of physical environment were significantly inversely associated with symptomatology of the winter-over syndrome. These characteristics of station environments were also significantly inversely associated with subsequent risk of total first hospital admissions relative to a group of 2,396 enlisted Navy men who volunteered for winter-over duty and were evaluated as medically and psychologically qualified for such duty but who were assigned elsewhere. The results suggest that adaptation to extreme social and physical environments may provide long-term health benefits for certain individuals. (Auth.)

H-45387

Gander, P.H., Macdonald, J.A., Montgomery, J.C., Paulin, M.G., **Adaptation of sleep and circadian rhythms to the antarctic summer: a question of zeitgeber strength,** *Aviation, space, and environmental medicine,* Nov. 1991 62(11), p.1019-1025, 26 refs.

Adaptation of sleep and circadian rhythms was examined in three temperate-zone dwellers arriving in Antarctica during summer. Rectal temperature, wrist activity, and heart rate were monitored continuously, sleep timing and quality noted on awakening, and mood and fatigue rated every 2 h while awake. Sleep was poorer in 2/3 of subjects in Antarctica, where all subjects reported more difficulty rising. Sleep occurred at the same clock times in New Zealand and Antarctica; however, the rhythms of temperature, activity, and heart rate underwent a delay of about 2 h. The subject with the most antarctic experience had the least difficulty adapting to sleeping during constant daylight. The subject with the most delayed circadian rhythms had the most difficulty. The delay in the circadian system with respect to sleep and clock time is hypothesized to be due to differences in zeitgeber strength and/or zeitgeber exposure between Antarctica and New Zealand. (Auth.)

H-45578
Lugg, D.J., Sullivan, P., Gormly, P.J., **Human interactions with the antarctic environment,** 1991-1992 Australian Antarctic Research Program. Antarctic Treaty exchange information: Supplement A to particulars for ANARE, Kingston, Tasmania, 1991, p.87-90.

A project is proposed to gain an understanding of the effects of the antarctic environment on humans; to gain a detailed knowledge of the problems of adapting to life in Antarctica; and to improve health care in Antarctica. The program is multidisciplinary, with particular emphasis on studies that facilitate living and working in Antarctica. Annual projects will depend on the ability of station doctors to carry out research.

H-45867
Taylor, A.J.W., Peri, A., **Human factors in design of an antarctic winter habitat,** *New Zealand antarctic record,* 1991 11(1), p.4-13, 17 refs.

A three-dimensional matrix is presented that takes into account the distinctive reactions of people living under isolated conditions in Antarctica. It includes constructional features, group size, and behavioral parameters. The proposition is that such a matrix might help environmental designers to construct an antarctic base that will be more congenial and less productive of tension than otherwise might be the case. (Auth.)

H-45872
Tzabar, Y., Pennington, T.H., **Population structure and transmission of *Escherichia coli* in an isolated human community; studies on an antarctic base,** *Epidemiology and infection,* Dec. 1991 107(3), p.537-542, 11 refs.

The population structure and transmission of *Escherichia coli* in a small group of individuals isolated for 26 weeks on an antarctic base were studied by multilocus electrophoresis of eight enzymes and plasmid analysis. Two hundred and sixty-nine strains were isolated. They were grouped into 60 allozyme types (ETs). Half of these ETs were only isolated once; others were repeatedly isolated from single subjects. Eleven were found in more than one subject and the pattern of the occurrence of some of them was considered to provide evidence of their spread from subject to subject. (Auth.)

H-46072
Pekkarinen, A., Soini, S., Hassi, J., Laapio, H., **Accident and risk evaluation on Finnish antarctic expeditions,** *Polar record,* Apr. 1992 28(165), p.145-148, 6 refs.

The first Finnish expedition to the Antarctic, made in 1988-1989, included 5 men. The second, a year later, included 57, mostly researchers. Accidents that occurred during the expeditions were recorded by a medical doctor and their incidence rate and severity were estimated. The few accidents that occurred did not cause disability. Some 20 risk factors were evaluated from two questionnaires filled out during the journeys to and from Antarctica, using a scale from extremely safe to extremely unsafe. Working conditions were judged safer than had been expected, as were weather factors (wind, temperature, ice and snow circumstances). The most dangerous items identified, in order of importance, were moving along unmarked routes, weariness, unexpected dangers, hurry and tight schedules, and snow and ice. During the homeward journey, equipment for communication and for moving as well as personal equipment were judged more dangerous than had been expected in advance. Preparations for future expeditions should give more attention to these factors. (Auth.)

H-46085
Chang, S.K., **Human elements for successful overwintering,** *Korean journal of polar research,* Dec. 1991 2(2), p.117-124, In Korean with English summary. 7 refs.

Some recommendations are made regarding the selection of wintering-over personnel at King Sejong Station, to prevent individual and group-related psychological problems created by isolation, harsh climate, and strict regulations.

H-46253
U.S. National Aeronautics and Space Administration, U.S. National Science Foundation, **Biomedical Polar Research Workshop minutes,** Washington, D.C., 1990, 80p., Refs. passim.

On Oct. 11-12, 1990 NASA and NSF conducted a workshop to discuss potential areas of biomedical research to be conducted jointly in the Arctic and Antarctic. This workshop was held as part of an ongoing science planning effort to utilize the remote environment of manned polar bases as analogs for the space environment. NASA Life Sciences is developing research programs that focus on the long-term health effects of the space environment. The workshop was conducted to provide a background of NASA and NSF goals, an overview of previous and current biomedical research, and a discussion about areas of potential future joint activities. The objectives of the joint research were defined as follows: to develop an understanding of the physiological, psychological, and behavioral alterations and adaptations to extreme environments of the polar regions; to ensure the health, well-being, and performance of humans in these environments; and to promote the application of biomedical research to improve the quality of life in all environments.

H-46320
Reed, H.L., D'Alesandro, M.M., **Changes in thyroid hormone status with antarctic residence,** *Antarctic journal of the United States,* 1990 25(5), p.236-237, 13 refs.

A paired design was used to study men in Aug. while in California; after 20-24 weeks of residence at McMurdo Station; and again after 40-44 weeks of antarctic residence. Changes found are summarized in 5 categories, as follows: pituitary physiology; serum static values; serum kinetic values; experimental cold adaptation; and cellular T3 binding capacity. Changes in human thyroid hormone function with prolonged polar residence could extend the understanding of circannual changes observed during mid-latitude winters.

H-46321
Palinkas, L.A., Johnson, J.C., **Social relations and individual performance of winter-over personnel at McMurdo Station,** *Antarctic journal of the United States,* 1990 25(5), p.238-240, 11 refs.

Evaluations of 131 winter-over crew members at McMurdo Station were conducted by the winter-over officer-in-charge, medical officer, ANS resident manager, the Navy clinical psychologist, and the principal investigator. Data analysis produced two noteworthy results: based on centrality score, highly central station members of McMurdo Station's winter-over crew were emotionally well-adjusted; contrary to expectations, however, station members who scored low on measures of emotional stability and supervisor/clinical evaluations of individual performance were not socially isolated. The winter-over syndrome does not seem to be dysfunctional at the level of social compatibility, as determined by peer nominations. In Antarctica, depression appears to be unrelated to social network membership and compatibility. The lack of an association may be interpreted as evidence of the tolerance of symptoms of the winter-over syndrome within the cultural systems of antarctic research stations, and the use of these symptoms as a means of coping with the prolonged isolation and extreme environmental conditions when other mechanisms have failed.

H-46973
Mocellin, J.S., Suedfeld, P., Bernadelz, J.P., Barbarito, M.E., **Levels of anxiety in polar environments,** *Journal of environmental psychology,* Sep. 1991 11(3), p.265-275, 30 refs.

To test the common assumption that being part of an isolated group in the polar winter represents an anxiety-arousing environment, trait and state anxiety levels were measured in two Argentine stations in Antarctica and two Canadian sites in the High Arctic. The group scores were compared with each other, with comparison groups drawn from the same population as the polar teams but not working in isolated polar stations, and with available norms. Anxiety levels were about the same in both isolated crews, and showed no differences from the comparison groups. Data from Argentine subjects showed some differences from published U.S. norms. A sub-sample of the antarctic comparison group was retested twice in the Antarctic during the following year. No significant changes were found in either state or trait anxiety. The data support the view that even environments that appear to be dramatically stressful cannot be assumed to have pervasive negative effects; one must look at how the individuals in the environment actually experience it. (Auth.)

H-46998
Carrère, S., **Physiological and psychological patterns of acute and chronic stress during winter isolation in Antarctica,** Irvine, University of California, 1990, 197p., University Microfilms order No. 91-09638, Ph.D. thesis. Refs. p.174-188.

This research employed time series analysis techniques to provide a model of sequential environmental-person transactions in the chronically stressful setting of Antarctica. It examined the dynamic influences of discrete and ambient environmental factors on well-being, rather than treating the setting as a static composite variable. As a result, this study extends knowledge about both chronic stress and isolated and confined environments. Nine men spending the winter at Palmer Station participated in the research. Weekly measures of catecholamines, cortisol, and blood pressure were taken. The Bipolar Profile of Mood States was used to index psychological well-being. Subjects habituated to the predictable demands of the isolated and confined setting. Stress outcomes did not increase as a function of the length of stay. Participants did not adapt to the unpredictably changing weather. As weather conditions worsened, depression increased and catecholamine and systolic blood pressure levels decreased. Environmental forces at play in this setting did not operate alone. Acute events such as parties increased levels of catecholamines. During those times of both high winds and parties, the arousing qualities of the parties tempered the weather's depressing impact. The arrival of a new crew was associated with increases in blood pressure. (Auth. mod.)

H-47017
Morimoto, T., **Trend of the medical research in the Antarctic,** *Polar news,* Mar. 1991 No.52, p.43-44, In Japanese. 2 refs.

Medical research in Antarctica is important for psychological analysis of isolated groups; maintaining medical data banks of over-wintering personnel to predict future medical needs and to monitor the effects of the ozone hole on health; studying microbiology and immunology to prevent infectious diseases in polar regions; and for simulating the conditions of future space stations.

H-47162
Lima Ricciardi, E., Barros Tauriño, W., **Psychological tests of personnel at Artigas Station** [Estudio de algunos parámetros sicológicos en la dotación de la Base Científica "Artigas"], *Montevideo. Instituto Antártico Uruguayo. Actividad científica 1987/88,* Sep. 1989 Vol.3, p.111-134, In Spanish with English summary. 13 refs.

Preliminary results are discussed of a one-year study carried out at Artigas Station on the participants of the 1987-1988 antarctic expedition. The battery of psychological group tests used apply mainly to two research areas: selection of personnel and isolation effects.

H-47300
Lacoux, P.A., **Characterization of enterococcal isolates by restriction enzyme analysis of genomic DNA,** *Epidemiology and infection,* Aug. 1992 109(1), p.69-80, 23 refs.

A restriction enzyme analysis (REA) of chromosomal DNA for the intra-species characterization of enterococci is reported. The DNA was extracted by a rapid method and digested with the restriction enzyme *Sal* I to provide a characteristic 'fingerprint' consisting of 10-20 bands in the 1.6-5.0 kb range. One hundred and eighty enterococcal isolates were examined; 5 were type strains, 15 from an outpatient clinic and 160 from a geographically isolated British Antarctic Survey base. The epidemiologically unrelated out-patient clinic isolates gave readily distinguishable patterns, whereas isolates from the geographically isolated community showed evidence of colonization. This technique provided a highly discriminatory method of isolate characterization for *Enterococcus faecalis, E. faecium* and *E. durans* suitable for epidemiological studies. A sample of isolates was probed with 16+23 S ribosomal RNA from *Escherichia coli.* Discrimination between isolates was poorer than with REA, although good correlation was observed between the results of the two techniques. (Auth.)

See also:
B-45728 B-47004 B-47051 B-47052 G-45283 G-45888 G-45975 G-46095

I. METEOROLOGY

I-45070
Horrell, M.A., **Phytogeography and paleoclimatic interpretation of the Maestrichtian,** *Palaeogeography, palaeoclimatology, palaeoecology,* July 1991 86(1/2), p.87-138 (Pertinent p.90, 112-118), Refs. p.128-138.

Insight into the true nature of Cretaceous climate can best be gained through a worldwide study of the preserved climatic indicators. This study focuses on reconstructing the climate of the Maestrichtian (latest Cretaceous) based on the abundant published information from the geologic record. Specifically, the approach taken was to reconstruct the general patterns of the terrestrial ecological biomes based on the fossil megaflora and pollen record. Once the biomes were delineated, the climatic constraints on the present counterparts of these biomes were used to determine the prevailing climate of each region. Biome boundaries were recognized by discontinuities in the phytogeographic distributions of a variety of fossil plant groups. Detailed comparisons of fossil plant assemblages with present-day climatic preferences of nearest living relatives allowed each region to be assigned to a modern biome. Further comparisons with fossil leaf physiognomic studies and tree ring studies, integrated with an extensive database of climatically important sediments, helped to refine the biomal and climatic assignments. Altogether, 12 climatic zones corresponding to 7 major biome types have been recognized for the Late Cretaceous period. The pertinent pages integrate the antarctic realm, encompassing biomes 4, 5, 6, and 7, into the global pattern of the entire interpretive review. (Auth. mod.)

I-45073
Weaver, A.J., Sarachik, E.S., **Role of mixed boundary conditions in numerical models of the ocean's climate,** *Journal of physical oceanography,* Sep. 1991 21(9), p.1470-1493, 38 refs.

It is shown that a stable steady state obtained under a restoring surface boundary condition on salinity becomes unstable upon a switch to a flux boundary condition. The "polar halocline catastrophe" of F. Bryan occurs. It is shown that further integration of this collapsed state ultimately yields a steady, stable one-cell circulation with the approach being essentially chaotic but with significant energy at decadal period. The two-hemisphere ocean passes through many stages in which violent overturning O occurs (80 million cu m/s). These "flushes" occur in both hemispheres and are of one-cell structure. The time period between these flushes varies from several hundred to about one thousand years. A single 12-vertical-level hemispheric basin, spun up from an initial state of rest under mixed boundary conditions (restoring boundary condition on temperature and flux boundary condition on salinity), never reaches a steady state. Three characteristic stages are observed in the integration: a stage where the system oscillates with decadal time scale, a stage when the system undergoes a violent overturning flush, and a quiescent stage in which either deep water is forming or the thermohaline circulation is in a collapsed state. Sufficient vertical resolution is shown to be important in obtaining realistic models of the thermohaline circulation. It is shown that a steady state, which is stable under asynchronous integration and mixed boundary conditions, may become unstable upon a switch to synchronous integration. The models carry the instabilities to the high oceanic latitudes of both hemispheres. (Auth. mod.)

I-45076
Orlanski, I., Katzfey, J., **Life cycle of a cyclone wave in the Southern Hemisphere. Part I: Eddy energy budget,** *Journal of the atmospheric sciences,* Sep. 1, 1991 48(17), p.1972-1998, 46 refs.

An analysis of the energy budget for a storm that developed in the eastern Pacific on Sep. 4-6, 1987 showed the advection of the geopotential height field by the ageostrophic wind to be both a significant source and the primary sink of eddy kinetic energy. Air flowing through the wave gained kinetic energy via this term as it approached the energy maximum and then lost it upon exiting. Energy removal by diffusion, friction, and Reynolds stresses was small. The most important conclusion was that, while the wave grew initially by poleward advection of heat, the system evolved only up to the point where this source of eddy energy and the conversion of eddy potential to eddy kinetic energy was compensated for by energy flux divergence. Energy exported in this fashion was then available for the downstream development of a secondary system. This finding seems to differ from the results of other studies which have shown a decay primarily through transfer of energy to the mean flow via Reynolds stresses. This apparent inconsistency can be explained by the fact that the waves export energy downstream at exactly the same rate as they gain from upstream. The group velocity of the Sep. 4-6 storm, calculated from the ageostrophic geopotential height fluxes, showed that the energy packet comprising the system had an eastward group velocity slightly larger than the time-mean flow. (Auth. mod.)

I-45096
Zibordi, G., Meloni, G.P., **Correction of bihemispherical reflectance measurements for noncosine response of 2 *pi* steradian optics: a methodology and its application to antarctic studies,** *Remote sensing of environment,* July 1991 37(1), p.55-62, 15 refs.

Bihemispherical reflectance of the earth's surfaces is an important parameter in climatology because of its role in the energy exchange between atmosphere and biosphere. Theoretical factors have been computed to correct the bihemispherical reflectance obtained from exitance and irradiance measurements. Simulation of measurements related to different antarctic field conditions shows the low sensitivity of the computed correcting factors to the atmospheric optical thickness at sun zenith less than 75 deg. This fact suggests the use of climatological data in computations, avoiding additional in situ measurements, which could reduce the operational use of the correction methodology. Multispectral measurements, taken in Victoria Land with a radiometer working in the same bands as the Landsat Multi-Spectral Scanner (MSS), have been elaborated following the proposed correction scheme. Bihemispherical reflectance of fresh snow, which could have an unreliable value higher than 1.0 at high sun zenith angles when computed with exitance and irradiance taken by noncosine collector optics, has shown good agreement with published data. (Auth. mod.)

I-45099
Rowland, F.S., **Stratospheric ozone in the 21st century. The chlorofluorocarbon problem,** *Environmental science and technology,* Apr. 1991 25(4), p.622-628, 8 refs.

On the premise that the primary cause for the antarctic ozone loss, and the probable cause for the northern losses, is the increasing concentration in the stratosphere of anthropogenic chlorine which will persist for many decades, the relationship between increasing concentrations of CFC gases and ozone depletion is analyzed. The consequences are examined and suggestions are made on how to control and replace the CFCs.

I-45103

Krueger, A.J., **Nimbus-7 TOMS Antarctic Ozone Atlas: August through December 1990,** *U.S. National Aeronautics and Space Administration. Reference publication,* June 1991 NASA-RP-1264, 213p., N91-26651, Refs. p.211-213.

The development of the 1990 ozone hole was monitored using data from the Nimbus-7 Total Ozone Mapping Spectrometer (TOMS) instrument, produced in near-real-time. This Atlas provides a complete set of daily polar orthographic projections of the TOMS total ozone measurements over the Southern Hemisphere for the period Aug. 1 through Dec. 31, 1990. The 1990 ozone hole developed in a manner similar to that of 1987 and 1989, reaching a comparable depth in early Oct. This was in sharp contrast to the much weaker hole of 1988. The 1990 ozone hole remained at polar latitudes as it filled in Nov., in contrast to other recent years when the hole drifted to mid-latitudes before disappearing. Daily ozone values above selected Southern Hemisphere stations are presented, along with comparisons of the 1990 ozone distribution to that of other years. A new calibration scheme (Version 6) was used to process 1990 ozone values, as well as to reprocess those of previous years. (Auth. mod.)

I-45125

Weller, G., **Role of the polar regions in global change,** Actas de la Primera Conferencia Latinoamericana sobre Geofísica, Geodesia e Investigación Espacial Antárticas. (First Latin American Conference on Antarctic Geophysics, Geodesy and Space Research, Buenos Aires, July 30-Aug. 3, 1990. Proceedings.) Edited by A. Louro, M.A. Van Zele, and I. Velasco, ⌜Buenos Aires, Centro Latinoamericano de Física, 1990⌟, p.114-129, 27 refs.

The processes of interaction between the air, snow, and ice, land and ocean at high latitudes, and the feedback processes associated with these interactions, make the polar regions key areas of critical influence on global climate change. The polar regions are also repositories of data on past climates and atmospheric composition. It is suggested that a uniform warming of the polar regions, as predicted by the models, has not been observed so far. The observed changes vary greatly from region to region, with some regions showing warming and others cooling. The powerful feedback processes, as well as climatic changes which in turn affect the polar snow, ice and permafrost are discussed and illustrated.

I-45126

Van Loon, H., **Annual cycle in antarctic and middle south latitudes,** Actas de la Primera Conferencia Latinoamericana sobre Geofísica, Geodesia e Investigación Espacial Antárticas. (First Latin American Conference on Antarctic Geophysics, Geodesy and Space Research, Buenos Aires, July 30-Aug. 3, 1990. Proceedings.) Edited by A. Louro, M.A. Van Zele, and I. Velasco, ⌜Buenos Aires, Centro Latinoamericano de Física, 1990⌟, p.130-159, 7 refs.

There is approximately the same amount of land and water in low latitudes north and south of the equator; but as one goes poleward the oceans expand on the Southern Hemisphere to cover the whole circumference in middle latitudes, whereas land expands in the same regions on the Northern Hemisphere. The different distribution of land and sea on the hemispheres is reflected in the mean temperature: a figure shows the difference in surface-air and 500-mb temperature averaged along latitude circles for corresponding months—Southern minus Northern Hemisphere. Between 30 and 60 deg. lat., where there is considerably more water on the Southern Hemisphere, the winters are warmer there than in the Northern Hemisphere and the summers cooler. The south polar regions, however, are colder than the Arctic in all months, especially in autumn when the zonally averaged temperature falls more slowly in the Arctic because of the extensive, comparatively warm waters.

I-45127

Hoffmann, J.A.J., **Air temperature variations in Argentina and at stations in the adjacent subantarctic area, 1903-1989** [De las variaciones de la temperatura del aire en la Argentina y estaciones de la zona subantártica adyacente, desde 1903 hasta 1989 inclusive⌟, Actas de la Primera Conferencia Latinoamericana sobre Geofísica, Geodesia e Investigación Espacial Antárticas. (First Latin American Conference on Antarctic Geophysics, Geodesy and Space Research, Buenos Aires, July 30-Aug. 3, 1990. Proceedings.) Edited by A. Louro, M.A. Van Zele, and I. Velasco, ⌜Buenos Aires, Centro Latinoamericano de Física, 1990⌟, p.160-168, In Spanish. 9 refs.

Meteorological data collected at Orcadas Station since 1903 are discussed and presented in a table. Analysis of data shows an atmospheric warming over the South Orkney Is. and Río Gallegos since the 1930s and 1940s, respectively. The average value of temperature increase between 1930 and 1989 is found to be 1.7 C. It is not determined whether the warming is due to natural causes or human factors.

I-45128

Menéndez, C., Orlanski, I., **Sea ice influence on the development of a cyclone in Antarctica** [Influencia del hielo marino en el desarrollo de un ciclón en la Antártida], Actas de la Primera Conferencia Latinoamericana sobre Geofísica, Geodesia e Investigación Espacial Antárticas. (First Latin American Conference on Antarctic Geophysics, Geodesy and Space Research, Buenos Aires, July 30-Aug. 3, 1990. Proceedings.) Edited by A. Louro, M.A. Van Zele, and I. Velasco, ⌜Buenos Aires, Centro Latinoamericano de Física, 1990⌟, p.169-178, In Spanish. 9 refs.

Various numerical experiments, conducted to study the effects of the extent of sea ice on antarctic climate, are described. Preliminary results with a description of models used in the experimentation are given on the influence of sea ice cover around Antarctica on the development of an explosive cyclogenesis which occurred on Sep. 5, 1987, in the South Pacific Ocean. The lowest pressure at sea level during the storm reached 950 hPa. It is concluded that neither the ice surface roughness nor the surface heat flow contribute significantly to the intensification of subantarctic cyclones.

I-45131

Ereño, C.E., Tarallo, L.I., **Antarctic climate manifestations from observations on South Orkney Is.** [Indicaciones del clima antártico a partir de observaciones realizadas en las islas Orcadas⌟, Actas de la Primera Conferencia Latinoamericana sobre Geofísica, Geodesia e Investigación Espacial Antárticas. (First Latin American Conference on Antarctic Geophysics, Geodesy and Space Research, Buenos Aires, July 30-Aug. 3, 1990. Proceedings.) Edited by A. Louro, M.A. Van Zele, and I. Velasco, ⌜Buenos Aires, Centro Latinoamericano de Física, 1990⌟, p.196-206, In Spanish. 9 refs.

Major findings reported include the following: that the mean annual temperature of the South Orkneys is a good climatic indicator of the annual ice conditions in the Weddell Sea, although not for those in the Bellingshausen Sea; the seasonal temperature averages are generally not good indicators of areas covered by sea ice; that the good correlations observed between the mean annual temperature at South Orkneys and the mean annual ice edge latitude justifies the use of these parameters as indicators of antarctic climate; and that the temperature records, the freezing and thawing dates, and the number of days in which the Scotia Bay remained blocked by ice show a trend of increasing temperature, and decreasing ice formation, particularly in the last 20 years.

I-45134

Artaxo, P., Maenhaut, W., **Trace elements in atmospheric aerosols from the Antarctic Peninsula,** Actas de la Primera Conferencia Latinoamericana sobre Geofísica, Geodesia e Investigación Espacial Antárticas. (First Latin American Conference on Antarctic Geophysics, Geodesy and Space Research, Buenos Aires, July 30-Aug. 3, 1990. Proceedings.) Edited by A. Louro, M.A. Van Zele, and I. Velasco, [Buenos Aires, Centro Latinoamericano de Física, 1990], p.222-230, 10 refs.

The average elemental concentrations and the aerosol mass concentrations measured in 1985 to 1987 at Comandante Ferraz Station are presented in a table. The strong dominance of sea-salt elements is evident. The concentrations of elements associated with soil dust were very low. The sulphur concentration in the fine mode was 77 ng/cu m, and in the coarse mode, where sulphur is mainly related to sea-salt spray, its concentration was 81 ng/cu m. The aerosol mass concentration was very low at 2.3 micrograms/cu m in the fine mode and 4.6 micrograms/cu m in the coarse mode. The concentrations of trace elements that could be associated with anthropogenic sources like Cr, Ni, Cu and Pb are very small, although they were observed in a significant number of samples. (Auth.)

I-45146

Moreira-Nordemann, L.M., Setzer, A.W., Forti, M.C., **Sulfate, nitrate and acidity in antarctic rain** [Sulfato, nitrato e acidez na chuva marinha da Antártica], Actas de la Primera Conferencia Latinoamericana sobre Geofísica, Geodesia e Investigación Espacial Antárticas. (First Latin American Conference on Antarctic Geophysics, Geodesy and Space Research, Buenos Aires, July 30-Aug. 3, 1990. Proceedings.) Edited by A. Louro, M.A. Van Zele, and I. Velasco, [Buenos Aires, Centro Latinoamericano de Física, 1990], p.337-348, In Portuguese. 22 refs.

Forty-five samples of rain water collected at Comandante Ferraz Station during Feb. 1985 and Jan. and Feb. 1986 and 1987 were analyzed for sodium, sulfate and nitrate concentrations. The tabulated results show 4 groups of samples with pH values and minimum and maximum concentrations of the 3 ions. Considerations of meteorological conditions at the time of the sample collection, such as the direction and speed of wind, are taken into account in the analysis and also presented in tables. The possible sources of excessive concentrations of sulfate and nitrate found in Antarctica are discussed.

I-45155

Kvaran, A., **Is the depletion of the ozone layer due to chemistry** [Er eyding ósonlagsins af völdum efnahvarfa], *Natturufraedingurinn,* 1990 (Pub. 1991) 60(3), p.127-134, In Icelandic with English summary. 8 refs.

The proposed effect of chlorofluorocarbons on the depletion of the ozone layer is described. The major chemical reaction of ozone in the atmosphere is with oxygen atoms to form oxygen molecules. This depletion reaction is made up for by ozone formation due to recombination of oxygen atoms and molecules in a three-body collision. Thus a steady state concentration of ozone is established with maximum concentration at an altitude of just over 20 km. The equilibrium, however, can be shifted towards a lower ozone concentration due to halogen atom catalysis, after halogen atom release from chlorofluorocarbon molecules by UV solar radiation photolysis. Detailed measurements of chemical concentration of various compounds in the lower stratosphere over Antarctica support the hypothesis that polar stratospheric clouds play an important role in ozone depletion by halogen atom reformation due to surface catalysis. (Auth.)

I-45169

Yiou, P., **High-frequency paleovariability in climate and CO2 levels from Vostok ice core records,** *Journal of geophysical research,* Nov. 10, 1991 96(B12), p.20,365-20,378, Refs. p.20,377-20,378.

The high resolution of the Vostok records provides a unique look at the causes of paleoclimatic variability during the last complete glacial cycle. The records present strong evidence for the interaction between orbital forcing and internal physico-chemical mechanisms of variability. This interaction appears to account for the great wealth of spectral features found in the records. (Auth.)

I-45172

Cicerone, R.J., Elliott, S., Turco, R.P., **Reduced antarctic ozone depletions in a model with hydrocarbon injections,** *Science,* Nov. 22, 1991 254(5035), p.1191-1194, Numerous refs.

A concept is suggested for action to arrest ozone loss over Antarctica by injecting the alkanes ethane or propane (E or P) into the antarctic stratosphere. A numerical model of chemical processes was used to explore the concept. The model results suggest that annual injections of about 50,000 tons of E or P could suppress ozone loss, but there are some scenarios where smaller E or P injections could increase ozone depletion. Further, key uncertainties must be resolved, including initial concentrations of nitrogen-oxide species in austral spring, and several poorly defined physical and chemical processes must be quantified. There would also be major difficulties in delivering and distributing the needed alkanes. (Auth. mod.)

I-45177

Sakunov, G.G., Barteneva, O.D., **Scattering functions of the atmospheric surface layer in the polar regions,** *Akademiia nauk SSSR. Izvestiia. Atmospheric and oceanic physics,* Sep. 1990 26(2), p.99-103, Translated from Izvestiia. Fizika atmosfery i okeana. 7 refs.

Measurements of the light scattering function in the atmospheric surface layer of the polar regions are presented. Scattering functions corresponding to background conditions with a light flux asymmetry K between 1 and 1.2 and functions for dense haze (S(M) = 1 to 10 km), with the maximum occurring in the vicinity of the first and second rainbow angles at temperatures between -15 deg and -30 deg C, are presented. Differences in the form of the scattering functions related to the atmospheric transparency are investigated. (Auth. mod.)

I-45179

Kadokura, A., Ejiri, M., Ohta, S., Akiyama, H., **Polar Patrol Balloon (PPB) experiment of the 30th Japanese Antarctic Research Expedition (1989-1990),** *Antarctic record,* July 1991 35(2), p.143-154, 3 refs.

The launching of the Polar Patrol Balloon (PPB) was carried out on Jan. 5, 1990. The trajectory of the PPB was about seven-eighths of a perfect circumpolar one. The auto-ballast system was normally operated to keep the flight level above 27 km for 15 days. When all the ballast had been consumed, the balloon drifted lower. Before the ballast was completely consumed the balloon drifted westward with a constant speed of about 18.7 deg/d. After that, the drifting speed gradually slowed down, eventually becoming zero on Jan. 25. On

Jan. 29, the balloon started drifting eastward. The solar zenith and sunset angles were calculated at balloon height; it was found that the increase of ballast consumption began at the time when the maximum solar zenith angle became greater than a critical angle, in this case 92.4 deg. To understand the balloon drifting motion, height profile data of zonal wind were referred to at Showa Station during the flight. When the balloon changed its drifting direction, the zonal wind direction was westerly at the balloon height. (Auth. mod.)

I-45182

Kanzawa, H., Kondo, Y., **Plan for observation of the antarctic ozone hole in 1991 under the Polar Patrol Balloon (PPB) project,** *Antarctic record,* July 1991 35(2), p.227-237, Refs. p.235-237.

Among the three Polar Patrol Balloon (PPB) experiments planned in the course of JARE-32, one balloon will be launched from Showa Station in Sep. 1991 to observe the ozone hole. *In situ* measurements will be made of ozone, aerosol, and temperature along the track of the balloon around the 50 hPa level (about 18 km) for about 10 days. The PPB observation is the Lagrangian type, and it will be held around the 50 hPa level where the ozone decreases most. The ozone concentration measurement will show the *in situ* chemical budget of ozone more directly than other types of observation. The aerosol instrument measures aerosol concentrations in the diameter range of 0.4-10 microns, divided into 7 classes to give detailed information on the microphysics and chemistry of the PSCs. Data acquisition and balloon positioning will use the ARGOS system. (Auth. mod.)

I-45199

Trenberth, K.E., **Storm tracks in the Southern Hemisphere,** *Journal of the atmospheric sciences,* Oct. 1, 1991 48(19), p.2159-2178, 35 refs.

Storm-track activity is remarkably persistent throughout the year in both location and intensity in the SH. The storm track is farthest poleward in the transition seasons as part of a semiannual cycle, but remains near 50S year round, and is strongest in the southern Indian Ocean and weakest in the South Pacific. There is a strong relationship between the storm track and the major tropospheric polar jet stream and its associated lower-level baroclinicity throughout the year, and the distribution of storm-track activity can be accounted for by baroclinic theory. Strongest meridional temperature gradients in middle latitudes are found in the summer half-year in the SH; summer activity is as strong as in winter. The zonal symmetry is greater in summer and meridional profiles are sharper, implying less variability in the storm track both within and between seasons. In winter, high-frequency storm-track activity extends over a broader range of latitudes and continues to be mainly associated with the polar jet stream. Baroclinic effects from the poleward heat flux dominate in winter and the eddies act to decelerate the upper troposheric westerlies. Barotropic effects in the upper troposphere help to maintain the mean westerly distribution by accelerating the main polar jet and maintaining the mean split in the flow near New Zealand in both summer and winter, and even dominate the baroclinic component in the storm track in summer. (Auth. mod.)

I-45227

Iurganov, L.N., Radionov, V.F., **Variations in the total column abundances of atmospheric carbon monoxide and methane in the polar regions,** *Antarctic science,* Dec. 1991 3(4), p.443-449, 13 refs.

Atmospheric carbon monoxide and methane were studied spectroscopically in the Arctic and Antarctic. Seasonal variations of CO are evident in both polar regions, absolute values of abundance being three times larger in the Arctic than in the Antarctic. Increasing concentration trends were confirmed for both gases: 0.8% per year for antarctic CO, 0.5% per year for antarctic CH4 and 3.1% per year for arctic CH4. (Auth.)

I-45228

Byrne, G.J., Benbrook, J.R., Bering, E.A., **Balloon observations of stratospheric electricity above the South Pole: vertical electric field, conductivity, and conduction current,** *Journal of atmospheric and terrestrial physics,* Sep. 1991 53(9), p.859-868, 31 refs.

This paper summarizes measurements acquired in the austral summer of 1985-1986. The major findings are: (1) the data contribute to the set of global atmospheric electricity measurements to determine the electrical environment of the south polar region. (2)The average vertical profile of the conductivity at the South Pole suggests that the conductivity scale height may increase with increasing geomagnetic latitude across the polar cap. (3)The conductivity profiles measured at the South Pole and other antarctic locations differ significantly from polar cap model profiles. (4)The magnitudes of the Ez profiles varied from day-to-day by a factor of >2. (5)In all of the flights the air-Earth conduction current Jz decreased with altitude in agreement with previous direct measurements of the air-Earth current. (6)The magnitude of Jz was 2-3 times larger than the global average, which can be attributed to the lower columnar resistance of the atmosphere above the high-elevation antarctic plateau. (7)Ez from all of the flights during times of balloon float demonstrates characteristics of the classical 'Carnegie' diurnal variation, which is indicative of global influences on the ionospheric potential. (8)The influence of geomagnetic activity was observed as a decrease in the amplitude of the diurnal variation of Ez with increasing geomagnetic activity index Kp. (Auth. mod.)

I-45230

Iwasaka, Y., Hayashi, M., **Nitric acid trihydrate particle formation in the polar stratosphere and its effect on nitric acid transport to the troposphere,** *Journal of geomagnetism and geoelectricity,* 1991 43(8), p.667-675, 17 refs.

Growth and sedimentation of type-I polar stratospheric cloud (PSCs) particles including nitric acid are examined using a numerical model. The PSC particles which grow in the upper particle layer have large enough size (about 10 microns) to descend rapidly to the tropopause within several days. In the lower part of the PSCs layer, evaporation of HNO3 from particulate matter occurs and acts as a source of HNO3 vapor. From the viewpoint of stratospheric HNO3 distribution, the particle sedimentation effectively functions as a vertical transport mechanism of HNO3 vapor from the upper PSC layer to the lower layer and/or to the troposphere. Data from antarctic stations are cited. (Auth. mod.)

I-45232

Safronov, V.A., **System of gathering hydrometeorological information in the Soviet Antarctic Expedition and its prospects** [Sistema sbora gidrometeorologicheskoĭ informatsii v sovetskoĭ antarkticheskoĭ ekspeditsii i ee perspektivy], Sistemy i sredstva morskoĭ radiosviazi; sbornik nauchnykh trudov (Systems and means of marine radio communication; collection of scientific papers). Edited by V.I. Peresypkin, Moscow, Transport, 1990, p.41-49, In Russian.

This paper is an analysis of the existing systems of gathering, processing, transmitting, and disseminating hydrometeorological data by the observation network in Antarctica, which is comprised of antarctic stations and the ships navigating in the southern ocean, supplying synoptic telegrams. The volume of information that must be transmitted along the communication channels is examined. (Auth. mod.)

I-45239
Alekseev, L.S., **Comparison of meteorological conditions at Molodezhnaya Station and adjacent runways** [Sravnenie meteorologicheskikh usloviĭ na stantsii Molodezhnoĭ i blizlezhashchikh VPP], *Sovetskaia antarkticheskaia ekspeditsiia. Trudy,* 1990 Vol.89, p.36-41, In Russian. 4 refs.

The mechanism linking meteorological parameters was studied by comparing data obtained at Molodezhnaya Station in Jan.-Dec. 1986 with data from automatic stations located on the runways at Gora Vechernaia and Gora Gorodkov. Tables showing wind velocity and atmospheric temperature and pressure at the 3 locations, and graphs resulting from the comparison of the data, are presented. The results are found useful in weather forecasting for the area.

I-45241
Mikhaĭlov, N.F., **Comparative radio observations of meteorological conditions on the runways of Gora Vechernaya and Gora Gorodkov at Molodezhnaya Station** [Sravnitel'nye radiolokatsionnye nabliudeniia za meteorologicheskimi usloviiami VPP gor Vecherneĭ i Gorodkova na AMTS Molodezhnoĭ], *Sovetskaia antarkticheskaia ekspeditsiia. Trudy,* 1990 Vol.89, p.45-47, In Russian.

A 1986 355-day study of weather conditions leading to probability of closing down the runways at Gora Gorodkov and Gora Vechernaya to flights of heavy airplanes and work on the runway is discussed. Results, shown in a table with month to month probability values, indicate more than 26 days in which the runways were closed both to flights and routine work.

I-45242
Tsvetkov, A.S., **Possible use of GRID code information in meteorological support operations in the Antarctic** [O vozmozhnostiakh ispol'zovaniia informatsii v kode GRID dlia meteorologicheskogo obespecheniia v Antarktike], *Sovetskaia antarkticheskaia ekspeditsiia. Trudy,* 1990 Vol.89, p.47-50, In Russian.

Sixty 72-hour predictions of the surface pressure field in the South Polar region, retrieved from the European Forecasting Center in GRID code, were evaluated for accuracy and found to be 90% correct.

I-45244
Liubarskiĭ, A.N., **Climatic zoning of polar regions by cluster analysis** [Klimaticheskoe raĭonirovanie poliarnykh oblasteĭ metodom klasternogo analiza], *Sovetskaia antarkticheskaia ekspeditsiia. Trudy,* 1990 Vol.89, p.57-67, In Russian. 5 refs.

The determination by cluster analysis of 7 climatic fields and 4 climatic regions in the Arctic, and 4 climatic fields and one climatic region in the Antarctic, is reported. It is concluded that the application of quantitative criteria in the Euclidian space metrics framework results in a more accurate evaluation of similarities and differences between fields and regions, and a better determination of climatic borders between them, than in qualitative classifications.

I-45246
Kolosova, N.V., Uranov, E.N., Skliarov, E.A., **Meteorological conditions at the Druzhnaya-3 base in the summer and fall of 1987 and 1988** [Meteorologicheskie usloviia v raĭone bazy Druzhnaya-3 v letne-osennie periody 1987 i 1988 gg.], *Sovetskaia antarkticheskaia ekspeditsiia. Trudy,* 1990 Vol.89, p.72-80, In Russian. 4 refs.

Atmospheric pressure and temperature, and wind speed and direction, obtained at the Druzhnaya-3 geological base in Jan.-Mar. 1987 and 1988, are discussed, shown on graphs and compared with data from 1951 and 1957-1970. No significant differences in compared values are found.

I-45251
Oglesby, R.J., **Joining Australia to Antarctica: GCM implications for the Cenozoic record of antarctic glaciation,** *Climate dynamics,* July 1991 6(1), p.13-22, 18 refs.

In this paper, a previous General Circulation Model (GCM) study concerning the formation and maintenance of antarctic glaciation is expanded to include the joining of Australia to Antarctica; the two continents were physically connected prior to about 40 million years ago. It has been proposed that the increased continentality resulting from the enlarged landmass inhibited glaciation by increasing the degree of summer heating. However, simulations suggest little change in the net antarctic snow accumulation when Australia is joined to Antarctica, even under extreme variations in sea surface temperature (SST) and topography. If anything, there is a slight increase in the net accumulation with the larger landmass. The climate of Australia does change markedly, consistent with the roughly 30 deg poleward shift in latitude. These results may not be inconsistent with paleoclimatic data from the early Cenozoic and the Cretaceous, with temperate flora and fauna along the coast, and large ice sheets inland. (Auth. mod.)

I-45255
Dameris, M., Berger, U., Günther, G., Ebel, A., **Ozone hole: dynamical consequences as simulated with a three-dimensional model of the middle atmosphere,** *Annales geophysicae,* Oct. 1991 9(10), p.661-668, 17 refs.

The dynamic effects caused by an ozone hole are simulated with a mechanistic three-dimensional global model of the middle atmosphere which covers a height range from 0-150 km. The model includes a radiation scheme which explicitly calculates the heating and cooling rates according to the emission and absorption of infrared and solar radiation at every grid point of the model. The ozone hole is prescribed to exist in a simplified form at heights between 11 and 34 km over the polar cap. In the first experiment the strength of the ozone hole is defined by observations made in the austral spring of 1987. The model results clearly indicate that the dynamic response of the middle atmosphere to an ozone hole is not limited to the polar lower stratosphere. Remarkable changes are observed in the polar troposphere and mesosphere/lower thermosphere and in the equatorial lower stratosphere. Most of the model results are in good agreement with findings of numerical calculations done with GCMs and with principal features derived from observations. A second experiment was performed, by increasing the level of ozone depletion and its horizontal extent, to study the possible response of the atmosphere to an additional decrease of the total amount of ozone. (Auth. mod.)

I-45258
Hodell, D.A., Warnke, D.A., **Climatic evolution of the southern ocean during the Pliocene epoch from 4.8 to 2.6 million years ago,** *Quaternary science reviews,* 1991 10(2/3), p.205-214, Refs. p.213-214.

Relatively warm climatic conditions prevailed in the southern ocean during the early Early Pliocene (between 4.6 and 4.2 Ma) as evidenced by benthic and planktonic delta O-18 values that were generally less than in the Holocene. Despite this warmth, significant ice-rafting episodes are recorded at several drill sites and piston-core locations throughout the southern ocean. This interval correlates with a eustatic highstand and represents a climatic optimum for the southern ocean when low- and mid-latitude species migrated into the

Antarctic and surface waters were warmer than at present. Although it is generally agreed that this interval was warm in the Southern Hemisphere, divergent opinions exist as to whether this warming led to the partial decay or growth of the antarctic ice-sheet. A distinct mid-Pliocene cooling occurred between 3.5 and 3.2 Ma, as evidenced by an increase in delta O-18 values of planktonic and benthic foraminifers and by faunal changes indicative of progressive cooling of antarctic surface waters and development of biotic provinciality in the southern ocean. A major climatic transition occurred at 2.4 Ma, when the PFZ moved to the north, sea ice expanded in the Antarctic, and glaciation intensified in both hemispheres. (Auth. mod.)

I-45268

Reeh, N., **New, detailed ice-age oxygen-18 record from the ice-sheet margin in central West Greenland,** *Global and planetary change,* Oct. 1991 4(4), p.373-383, 26 refs.

A new detailed oxygen-18 record measured on surface-ice samples from a West Greenland ice-margin location reveals the hitherto longest climatic record from the Greenland ice sheet, spanning the last c. 150,000 years. The new record implies that the Greenland deep ice-core records from Dye3 and Camp Century need to be re-interpreted. A comparison with the deuterium record from the Vostok deep ice core in Antarctica indicates that climate behaved differently in the Northern and Southern Hemispheres during the last glacial/interglacial cycle, with major differences occurring in Emiliani isotopic stage 5. (Auth.)

I-45308

Voskresenskiĭ, A.I., **Polar climatology in the modern epoch** [Poliarnaia klimatologiia v sovremennuiu epokhu], *Problemy arktiki i antarktiki,* 1991 Vol.66, p.104-117, In Russian with English summary. 34 refs.

Modern problems of polar climatology are analyzed. Advances in the formation of a concept of regional climate monitoring are shown. Reasons for the regular formation of a large negative anomaly of ozone over Antarctica in Oct. of 1980-1987 are explained. The problems of applied climatology as one of the key factors that decreases the net cost of products are considered. It is emphasized that management executives should promote meteorology and use the climatic information in industrial work. (Auth. mod.)

I-45332

Choi, H., **Structure of jetlike winds in the lower atmosphere, King George Island, Antarctica,** *Korean journal of polar research,* June 1991 2(1) (Special issue), Second International Symposium on Antarctic Science, Seoul, Korea, Sep. 17-18, 1990. [Proceedings], p.197-201, 7 refs.

The structure of jetlike winds in the lower atmosphere of King George I. was investigated from Apr. 13-15, 1987. The formation of coastal low-level jetlike wind is primarily associated with the upper tropospheric jet stream, due to the downward momentum transport from the upper level to the height of the jetlike wind, and is coupled with the frontal or subsidence inversion of the lower atmosphere. In addition, isallobaric high or low in the surface boundary layer, which induces divergence or convergence near the surface, also influences the formation of low-level jet, resulting in subsidence or upward motion in the coastal region. (Auth.)

I-45338

Markgraf, V., **Younger Dryas in southern South America?,** *Boreas,* Mar. 1, 1991 20(1), p.63-69, 40 refs.

Two high resolution pollen records, Caunahue from mid-latitudes and Harberton from high latitudes, illustrate the issues in defining the Younger Dryas episode in records from southern South America. At mid-latitudes in the Chilean lake region, previous claims for the existence of a substantially cooler and wetter episode between 11,000 and 10,000 BP can no longer be supported by new pollen records with high temporal and paleoenvironmental resolution, such as Caunahue. The transition from glacial to interglacial conditions occurred in several steps, one shortly after 13,000 BP, when open *Nothofagus* woodland was replaced by cool-temperate North Patagonian forest, and one at 9,500 BP, when warm-temperate Validivian forest elements replaced the North Patagonian elements. At high latitudes, on the other hand, high resolution records do show marked short-term changes during the late-glacial, including the 11,000 to 10,000 BP interval. However, neither the exact timing nor the duration of these changes is synchronous for specific taxa, neither within one record nor between different records. One of the two intervals of low pollen influx that has been singled out as evidence for a cooler episode is consistently dated between 11,000 and 12,000 BP, while the other interval dates between 10,800 and 9,000 BP. Based on all this information the author concludes that there is no evidence of a Younger Dryas episode for the mid-latitudes. For the high latitudes, on the other hand, the overall high paleoenvironmental variability in the records offers multiple choices for a Younger Dryas-type interval if specific taxa are selected without considering the overall context. However, the lack of synchroneity between short-term changes of specific taxa between different records suggests primarily a response to local disturbances, rather than a response to a global forcing. In conclusion, in the high latitudes, the different systems' paleoclimatic signals are all related to Antarctica and its forcing, and unrelated to the circum-North Atlantic Younger Dryas forcing. (Auth. mod.)

I-45342

Molina, M.J., **Heterogeneous chemistry on polar stratospheric clouds,** *Atmospheric environment,* 1991 25A(11), Symposium on Global Climatic effects of Aerosols, Reno-Sparks, NV, Oct. 11-13, 1989. Edited by J.P. Lodge, Jr., p.2535-2537, 21 refs.

Polar stratospheric clouds play a crucial role in the depletion of stratospheric ozone over Antarctica in the spring months. The cloud particles promote the conversion of the inert chlorine reservoirs HCl and ClONO2 to Cl2, which is photolytically active. Furthermore, the clouds lead to the removal of nitric acid and nitrogen oxides from the gas phase, facilitating the destruction of ozone by catalytic cycles involving chlorine free radicals. This paper discusses possible heterogeneous chemical reactions involved in stratospheric ozone depletion. (Auth. mod.)

I-45369

Okamori, K., Tanaka, S., Hashimoto, Y., **Transport of soil particles and pollutants to the ocean and their concentration distribution in the marine atmosphere. A study of marine aerosols collected on board the antarctic observation ship *Shirase*,** *Chemical Society of Japan. Journal,* 1991 No.6, p.759-765, In Japanese with English summary. 21 refs.

Atmospheric concentrations of Al, Si, Fe, S and Cl were measured over the Pacific, Indian and antarctic oceans. The samples, collected on board the observation ship *Shirase,* were analyzed by X-ray fluorescence analysis. The marine aerosols were collected every day by the low volume air sampler at flow rates of 20-30 1/min, between Fremantle and Showa Station in Dec. 1988, and between Showa Station and Sydney in Mar. 1989. The average concentrations of soil-derived elements over the Antarctic were very low: 6.5 ng/cu m for Al, 13.4 ng/cu m for Si, 3.5 ng/cu m for Fe. It is suggested that these values are the background concentrations of soil-derived elements in the marine atmosphere. Since the main source of S and Cl in the marine atmosphere is sea salt, a strong correlation between concentrations of S and Cl was observed over the Indian Ocean and the Antarctic. (Auth. mod.)

I-45374
Zhukov, V.A., **Causes of ozone depletion over the Antarctic,** *Soviet meteorology and hydrology,* 1989 Vol.12, p.97-102, 11 refs. For Russian original see 18I-42358.

Observed on the coast of Antarctica prior to the initial discovery of spring ozone minima was a sharp decrease in the concentration of cesium-137 with its subsequent restoration in spring. It is assumed that retention of these readily soluble aerosols in winter in the polar stratosphere was caused by their capture by particles of polar stratospheric clouds. The results of observation of radioactive tracers agree well with the hypotheses of the existence of mechanisms of photochemical decomposition and the dynamic interlatitudinal redistribution of antarctic ozone, but do not confirm a mechanism for its dynamic redistribution in spring with ascending flows in the polar atmosphere. (Auth. mod.)

I-45443
Agnew, D.J., **Investigations of required sampling regimes for environmental parameters,** Scientific Committee for the Conservation of Antarctic Marine Living Resources. Selected scientific papers 1990, Hobart, Tasmania, CCAMLR, 1991, p.561-573, 5 refs.

The sensitivity of different sampling regimes in identifying interannual changes in environmental parameters was investigated, using environmental data from Davis Station from 1985 to 1987. Strong daily, depressional (4 to 5 days) and yearly cycles were seen in temperature, wind speed and pressure. Sampling daily maxima and minima would be sufficient to detect a 2 to 3 C change in monthly mean temperature over two years with a significance alpha of 0.05 and a power P of 0.8. Sampling wind speed continuously or as daily maxima and minima would be sufficient to detect a 10 to 20% change in monthly mean log-transformed wind speed alpha of 0.05 and P of 0.9. (Auth.)

I-45472
Barry, R.G., **Climate-ice interactions,** Encyclopedia of earth system science, Vol.1. Edited by W.A. Nierenberg, San Diego, Academic Press, 1991, p.517-524, 11 refs.

Snow and ice are significant elements of the hydrosphere that undergo marked seasonal and long-term changes in extent and thickness. Snow forms in the atmosphere and where it falls on land may persist as a snow cover or a glacier, whereas sea ice grows principally by freezing of water in bulk. The variability of snow and ice cover arises from the proximity of mean terrestrial temperature to the freezing point of water. The presence of snow and ice modifies the global climate system through a complex series of interactions. Data are provided on the ice volume in Antarctica and the extent of sea ice in the Southern hemisphere. (Auth.mod.)

I-45476
LeDrew, E.F., **Polar regions, influence on climate variability and change,** Encyclopedia of earth system science, Vol.3. Edited by W.A. Nierenberg, San Diego, Academic Press, 1991, p.647-659, 10 refs.

The fundamental theme of this article is the effect of the characteristics and spatial patterns of ice and snow, in the arctic as well as antarctic regions, on climate from a regional to a global scale. The physical processes affecting the variability and change of climate are highlighted. The study of the effect of this variability and change on other life and physical processes on this planet is a major component of the global change research agenda. (Auth.mod.)

I-45477
Fahey, D.W., Kawa, S.R., **Polar stratospheric clouds,** Encyclopedia of earth system science, Vol.3. Edited by W.A. Nierenberg, San Diego, Academic Press, 1991, p.661-672, 10 refs.

Polar stratospheric clouds (PSCs) are a special class of atmospheric aerosol that is observed in the winter stratosphere at high latitudes. The clouds are limited to the polar regions because of the combined requirement of very low temperatures and sufficient amounts of the condensing species, water vapor and nitric acid. The presence of PSCs has been documented by a variety of satellite, balloon, aircraft, and ground-based observations. The co-condensation of water and nitric acid produces PSC particles composed of the nitric acid trihydrate phase at temperatures several degrees above the frost point. Below the frost point, PSCs form as ice particles containing trace amounts of nitric acid and other impurities. Particle sizes range from fractions of a micrometer to several micrometers. The extensive and regular formation of PSCs affects both the chemical and radiative balance in the lower atmosphere. The chemical balance is altered by heterogeneous reactions on cloud particle surfaces that change the partitioning within the reservoirs of reactive chlorine and reactive nitrogen trace species. Release of reactive chlorine in these reactions and the removal of reactive nitrogen on sedimenting PSC particles leads to enhanced ozone depletion in high-latitude winter. Because of the radiative temperature difference between the ground and PSC layers, the presence of PSCs can result in significant cooling of the cloud layer and changes in transport circulation. (Auth.)

I-45480
Bunn, F.E., Thirkettle, F.W., Evans, W.F.J., **Rapid motion of the 1989 arctic ozone crater as viewed with TOMS data,** *Canadian journal of physics,* Aug.-Sep. 1991 69(8/9), p.1087-1092, With French summary. 14 refs.

The data from the NIMBUS-7 TOMS instrument were used to study the arctic ozone layer in late winter and spring, 1989. This paper presents an analysis of TOMS total ozone values, to produce a picture of the morphology of the arctic stratospheric ozone crater in winter-spring 1989. The arctic crater formed in late January when the vortex moved off the pole to over Scandinavia. The TOMS data clearly show the arctic ozone-crater feature over Scandinavia and the western Soviet Union, on February 2, 1989. It later moved south to Baffin Island and then, in March, down over Toronto, and eventually to western Canada, near Edmonton. A similar unexpected crater was present in the Antarctic fall, on March 15, 1989. This phenomenon is mainly produced by dynamic uplift, but there may be ozone depletion occurring as well owing to reduced temperatures. (Auth.)

I-45481
Komhyr, W.D., Oltmans, S.J., Grass, R.D., Leonard, R.K., **Possible influence of long-term sea surface temperature anomalies in the tropical Pacific on global ozone,** *Canadian journal of physics,* Aug.-Sep. 1991 69(8/9), p.1093-1102, With French summary. 47 refs.

A significant negative correlation exists between Jun.-Aug. sea surface temperatures (SSTs) in the eastern equatorial Pacific and 15-31 Oct. total ozone values at South Pole, Antarctica. SSTs in the eastern equatorial Pacific were anomalously warmer by 0.67C during 1976-1987 compared with 1962-1975. Quasi-biennial oscillation (QBO) easterly winds in the equatorial Pacific stratosphere were generally stronger after 1975 than they were before that time. Prior to the early-to-mid 1970s the trend in global ozone was generally upward, but then turned downward. During 15-31 Oct. 1988, total ozone at South Pole, which had decreased from about 280 Dobson units (DU) prior to 1980 to 140 DU in 1987, suddenly recovered to 250 DU, though substantial ozone depletion by heterogeneous photochemical processes involving polar stratospheric clouds was still evident in the South Pole ozone vertical profiles. These observations suggest that the downward trend in ozone observed over the globe in recent years may have been at least partially meteorologically induced, possibly through modulation by the warmer tropical Pacific ocean waters of QBO easterly winds at the equator, of planetary waves in the extratropics, of the interaction of QBO winds and planetary waves, and of Hadley Cell circulation. (Auth.mod.)

I-45482
Bunn, F.E., Walker, A.E., **Global ozone trends from a reanalysis of TOMS data,** *Canadian journal of physics,* Aug.-Sep. 1991 69(8/9), p.1103-1109, With French summary. 16 refs.

Analyses of 10 years of daily average total ozone data for Mar. 15 and Oct. 10 were carried out. These days were chosen as they correspond, respectively, to the maxima in occurrence of the polar ozone thinning phenomena in the northern and southern polar regions. The NIMBUS-7 TOMS data provide one of the best data sets available with which to monitor global ozone depletion. Correcting for the TOMS drift in the 1979-1988 Mar. 15 and Oct. 10 data shows that a global ozone depletion is occurring at the rate of 0.224% per year. These analyses show that the maximum ozone-depletion rate occurs in the polar zone containing the ozone thinning phenomena. The southern zone depletion rate is some three times greater than the northern (1.06% compared with 0.39% per year), and the rate in the southern zone remains significantly above the global depletion rate, even during absence of the ozone thinning phenomenon (0.47% per year). This decrease is alarmingly greater than predicted by scenario models. (Auth. mod.)

I-45483
McConnell, J.C., Beagley, S.R., Evans, W.F.J., **Polar ozone depletion: current status,** *Canadian journal of physics,* Aug.-Sep. 1991 69(8/9), p.1110-1122, With French summary. 96 refs.

Rapid springtime depletion of column ozone is observed over the Antarctic during the austral spring. A much weaker springtime depletion is observed in the Arctic. This depletion results from a complex chemical mechanism that involves the catalytic destruction of stratospheric ozone by chlorine in the colder regions of the polar winter vortices. The magnitude of the spring depletion is much greater in the Antarctic than the Arctic due to the greater stability and longer duration of the southern polar vortex. The magnitude of the antarctic ozone depletion has been increasing since 1979 and its current depletion in October 1990 amounts to 60%. (Auth.mod.)

I-45484
McElroy, C.T., **SPEAM-I (sunphotometer Earth atmosphere measurement) observations of high-altitude ozone from STS 41-G,** *Canadian journal of physics,* Aug.-Sep. 1991 69(8/9), p.1123-1127, With French summary. 11 refs.

The sunphotometer Earth atmosphere measurement (SPEAM-I) experiment was flown on the United States space shuttle Challenger in Oct. 1984 as part of a group of Canadian experiments referred to as CANEX-I. Measurements of the solar intensity were made through the orbiter side-hatch window at various wavelengths in the visible and near-ultraviolet during a number of terminator crossings, using a hand-held interference filter photometer. Observations at 315 and 324 nm were analyzed to give vertical profiles of ozone at 63.4S, 91.96E. These profiles are compared with data from the literature. The success of this experiment points the way to the use of small instruments to make accurate but inexpensive observations of the composition of the upper atmosphere. (Auth.mod.)

I-45510
Randel, W.J., Lait, L.R., **Dynamics of the 4-day wave in the Southern Hemisphere polar stratosphere,** *Journal of the atmospheric sciences,* Dec. 1, 1991 48(23), p.2496-2508, 21 refs.

Dynamics of the 4-day wave in the Southern Hemisphere polar stratosphere are investigated using horizontal wind and temperature data. These were derived from synoptic maps of satellite-measured brightness temperatures, which were generated using the fast Fourier synoptic mapping technique of Salby. Circulation statistics from these data are compared to those from the National Meteorological Center (NMC) operational stratospheric analyses, demonstrating improvements afforded by detailed treatment of asynoptic sampling effects. The 4-day wave is isolated using temporally filtered data. Several events of wave growth and decay were observed in the upper stratosphere during Aug. 1980. Derived zonal-mean and eddy statistics suggest that the 4-day wave results from an instability of the zonal-mean flow near 55-60S, at and above 1 mb. Inspection of climatological data suggests the source of the instability to be the "double-jet" structure in the upper stratosphere and mesosphere (the subtropical mesospheric jet near 30S and the high-latitude extension of the polar night jet near 70S). Contribution of the 4-day wave to the general circulation of the stratosphere is discussed. One feature attributable to the 4- day wave is a region of positive EP flux divergence in the upper stratosphere near 50-60S. (Auth.)

I-45511
Manney, G.L., Mechoso, C.R., Elson, L.S., Farrara, J.D., **Planetary-scale waves in the Southern Hemisphere winter and early spring stratosphere: stability analysis,** *Journal of the atmospheric sciences,* Dec. 1, 1991 48(23), p.2509-2523, 20 refs.

Eastward-traveling waves 2 and 3 are frequently observed to grow in the Southern Hemisphere stratosphere during late winter and early spring. Observations show times when wave 2 growth appears to be confined to the stratosphere. This suggests that instability is one in situ mechanism that should be considered. The stability of stratospheric flows derived from data is examined during some of these times, using several linear models of quasigeostrophic instability. Unstable modes of both wave 2 and wave 3 have periods and spatial structures similar to observations. Wave 2 and 3 momentum fluxes are similar in observations and model results and are consistent with the transfer of kinetic energy from the zonal- mean flow to the wave. When a barotropic model with a zonally symmetric basic flow is used, wave 3 is usually most unstable. Including a stationary wave 1 in the basic flow destabilizes both wave 2 and 3, but has little effect on their periods or spatial structures. When a zonally symmetric flow with realistic meridional and vertical structure is used, resulting unstable modes have shorter periods and slower growth rates than for barotropic flows. Wave 2 is usually more unstable than wave 3 when realistic vertical structure is included. (Auth. mod.)

I-45513
Fawcett, P.J., Barron, E.J., **Geological perspective on climatic change: computer simulation of ancient climates,** *Geoscience Canada,* Sep. 1991 18(3), p.111-117, 25 refs.

Global climate models are used to make predictions for possible future climatic changes, but their ability to simulate climatic states other than the present day is not well constrained. The sedimentary record contains a wealth of information on past global climatic change. From this one can get a good idea of what past climatic extremes were, and some idea of their underlying causes. By simulating the climate of a past time, one can evaluate the ability of a climate model to represent a climatic state substantially different from the present day. At present, models are not well utilized to reproduce a global climatology for a particular time period. Rather, the models are used for sensitivity experiments. One geologic factor is varied (e.g., geography or CO2 level) while all others are held constant. In this way, the effect on the climate of changing that one factor can be tested, and insights into the mechanisms of global change are gained. The results are then compared with the geologic record. Two case studies are given as examples. They range through both polar regions during the Cretaceous and Late Pleistocene, showing the march of temperature from a global perspective; they serve as guides for assessing the nature of future global conditions. (Auth. mod.)

I-45560

Harris, C.M., ed, Stonehouse, B., ed, **Antarctica and global climatic change,** London, Boca Raton, FL, Bellhaven Press, Lewis Publishers, 1991, 198p., For individual papers see 46-2299 through 46-2308 or A-44574, B-44570, B-44571, D-44561, F-44566, F-44569, I-44562 through I-44565, I-44567, I-44572, I-44573 and J-44568.

The United Kingdom and New Zealand 1990 Symposium on Antarctica and Global Climatic Change was held in Selwyn College, Cambridge on June 26 and 27, 1990. The symposium specifically addressed an issue of great current interest—the importance of Antarctica and its surrounding ocean in studies of global climatic change. The symposium was divided into six sessions, each with a main speaker and a commentator, followed by discussion from the floor. The final discussion was followed by an historical overview. In this volume the papers and commentaries (which aim to criticize and extend points made in the main paper, but are briefer discussions) are presented under three main headings: Part 1, Current state of knowledge; Part 2, Atmosphere, ice and ocean; and Part 3, Ecology and management responses. The volume ends with a guide to recent literature on Antarctica and global climatic change.

I-45562

Ellis, J., **Antarctica and global climate change: review of prominent issues,** Antarctica and global climatic change, edited by C.M. Harris and B. Stonehouse, London, Boca Raton, FL, Bellhaven Press, Lewis Publishers, 1991, p.11-20, 8 refs.

Both New Zealand and Britain have strong research programs in atmospheric and climatic change. Being in temperate climates, both could be affected appreciably by global warming. New Zealand has already had ozone-depleted air pass over the South Island. Antarctic research has encouraged interdisciplinary science studies, and has provided a model in international cooperation. There is a major emphasis at present on measuring atmospheric changes, past and present, due to present concerns about changes in climate and sea levels, ultraviolet (UV) radiation levels and general atmospheric pollution. The Antarctic is a store of past knowledge on world climates and atmospheric changes. The ice, on average 2,000 m thick, carries within it the climatic history of the last 200,000 years. This is accessible through modern geochemical and biological techniques applied to ice cores and to glacial sediments. Specific topics being addressed include: observed and interpreted climatic changes; changes in atmospheric gas content; construction of models; ozone concentrations; and changes in the antarctic ice sheet as preserved in cores.

I-45563

Cattle, H., **Global climate models and antarctic climatic change,** Antarctica and global climatic change, edited by C.M. Harris and B. Stonehouse, London, Boca Raton, FL, Bellhaven Press, Lewis Publishers, 1991, p.21-34, 31 refs.

Antarctica plays a significant role for global climate from a number of points of view. It is a major component of the land-sea contrasts between the Northern and Southern Hemispheres, which themselves are important for the different characteristics of the flow in the two halves of the globe in both the atmosphere and oceans. As a result, the large-scale mean atmospheric flow in the Northern Hemisphere tends to be more wave-like in character than that of the Southern Hemisphere, where the flow is more highly zonal. The antarctic continent represents the major high-altitude topographic heat sink for the atmosphere. Indeed, the continental dominance of the Southern Hemisphere polar region contrasts markedly with the mediterranean aspect which prevails in the Arctic. Several investigators have constructed various models to quantify the hemispheric contrasts in circulation and thermal regimes, and these models are reviewed. The increasing influence on climate changes of rising global concentrations of natural and man-made CO2 is discussed and assessed.

I-45564

Barrett, P.J., **Antarctica and global climatic change: a geological perspective,** Antarctica and global climatic change, edited by C.M. Harris and B. Stonehouse, London, Boca Raton, FL, Bellhaven Press, Lewis Publishers, 1991, p.35-50, 44 refs.

In global climate studies, most weight has been placed on the development of mathematical models for the behavior of the atmosphere and oceans to predict future changes in climate, but their power is still limited by their sensitivity to initial conditions. An alternative approach is to study past changes in climate, the subject of this review. The sedimentary strata of Antarctica contain a record of the past climate of the continent. Consideration is limited to the last 400 million years, which is better represented and dated than earlier times. For most of that period the antarctic continent occupied a polar position and thus has been in the most favored position of all continents to accommodate and provide evidence of continental glaciation. Particular emphasis is on those aspects of the record in antarctic strata that can offer some perspective on likely changes in global climate and sea level arising from human activities. This geological perspective should be useful for two reasons. First, human influence on planetary processes has reached a geological magnitude. Second, a comparison of data from antarctic ice cores, deep sea cores and marine terraces shows a close association between CO2 levels, temperature, ice volume and sea level over the last glacial-interglacial cycle.

I-45565

Morris, E.M., **Antarctic ice studies in global climatic change: a comment,** Antarctica and global climatic change, edited by C.M. Harris and B. Stonehouse, London, Boca Raton, FL, Bellhaven Press, Lewis Publishers, 1991, p.51-62, 10 refs.

In developing a linked atmosphere-ice-ocean climatic change model it is necessary to test the various components against different time scales. This type model is full of complexities requiring examinations of the models for agreement with observations. Included are sample plots of temperature which demonstrate the necessity for this check. Some of the components of the model are ice temperature, change in precipitation rate, carbon dioxide levels, water circulation beneath ice shelves, and the ice shelves themselves as warming indicators. The author includes pertinent data from antarctic research.

I-45567

Squire, V.A., **Atmosphere-ice-ocean: do we really understand what is going on,** Antarctica and global climatic change, edited by C.M. Harris and B. Stonehouse, London, Boca Raton, FL, Bellhaven Press, Lewis Publishers, 1991, p.82-89, 12 refs.

The author argues that all the data available is insufficient to make a reliable prediction as to how the antarctic sea ice will react to the climate warming which is apparently occurring. The data gathered thus far point only to a very complex relationship in the air-ice-ocean system and do little to suggest how to understand it. Topological applications may be able to provide clues at some later time.

I-45572
Mosley, M.P., **Strategies for mitigating impacts of climatic change,** Antarctica and global climatic change, edited by C.M. Harris and B. Stonehouse, London, Boca Raton, FL, Bellhaven Press, Lewis Publishers, 1991, p.155-168, 6 refs.

The author takes a look at his country, New Zealand, and how it stands in the matter of climatic changes due to man's actions and activities, and what New Zealanders can do to help resolve the problem. One of man's activities having the greatest effect on climate changes is the conversion of vegetation areas into sheep grazing ranges. He concludes that the root cause of anthropogenic climate changes is simply human selfishness, specifically in New Zealand and, by implication, globally.

I-45573
Hickman, J.S., **Strategies for mitigating impacts of climatic change: the science and the challenge,** Antarctica and global climatic change, edited by C.M. Harris and B. Stonehouse, London, Boca Raton, FL, Bellhaven Press, Lewis Publishers, 1991, p.169-176, 2 refs.

Some of the historic milestones in climate research are pointed out: the 1st and 2nd Polar Years, the IGY, detection and measurement of atmospheric CO2, World Weather Watch (WWW), Global Atmospheric Research Programme (GARP), World Climate Research Programme, and the Intergovernmental Panel on Climate Research (IPCC), having a knowledge assembling and assessment function. The certain knowledge can be summed up in two simple statements. One is that the atmosphere acts as a blanket that keeps the Earth's surface warmer than it would be if there were no atmosphere containing radiatively absorbing gases. The effectiveness of the blanket is determined by the concentration in the atmosphere of radiatively absorbing gases—popularly called the greenhouse gases. The other statement is that human activities are increasing the concentration of greenhouse gases in the atmosphere at an apparently unprecedented rate. Possible response strategies are of two main types: limitation of net emissions of greenhouse gases, and adaptation to climatic change. Comments on the first option are made, and the ambivalence is noted of developing nations' need for economic stimulation which would entail producing more greenhouse gases and the industrial nations' need to reduce these gases to de-pollute the atmosphere.

I-45603
Markham, K.R., Franke, A., Given, D.R., Browney, P., **Historical antarctic ozone level trends from herbarium specimen flavonoids,** *Bulletin de liaison du groupe polyphenols,* 1990 Vol.15, p.230-235, 22 refs.

A novel method for the determination of historical ozone level trends in Antarctica is proposed, which involves the quantitative analysis of flavonoids in moss herbarium specimens. The results of preliminary studies on *Bryum argenteum* samples collected from the Ross Sea area over the period 1957-1989 reveal a trend which approximates measured changes in ozone levels at the South Pole. An unexpected drop in ozone levels is evident in the mid-1960s. (Auth.)

I-45604
Smith, R.C., **Ozone depletion: ultraviolet radiation and phytoplankton biology in antarctic waters,** *Science,* Feb. 21, 1992 255(5047), p.952-959, Refs. and notes p.957-959.

The springtime stratospheric ozone (O3) layer over the Antarctic is thinning by as much as 50%, resulting in increased midultraviolet (UVB) radiation reaching the surface of the southern ocean. There is concern that phytoplankton communities confined to near-surface waters of the marginal ice zone will be harmed by increased UVB irradiance penetrating the ocean surface, thereby altering the dynamics of antarctic marine ecosystems. Results from a 6-weeks cruise (Icecolors) in the marginal ice zone of the Bellingshausen Sea in austral spring of 1990 indicated that as the O3 layer thinned: (i) sea surface- and depth-dependent ratios of UVB irradiance (280 to 320 nanometers) to total irradiance (280 to 700 nanometers) increased and (ii) UVB inhibition of photosynthesis increased. These and other Icecolors findings suggest that O3-dependent shifts of in-water spectral irradiances alter the balance of spectrally dependent phytoplankton processes, including photoinhibition, photoreactivation, photoprotection, and photosynthesis. A minimum 6 to 12% reduction in primary production associated with O3 depletion was estimated for the duration of the cruise. (Auth.)

I-45611
Iwasaka, Y., Hayashi, M., **Two different stages in polar stratospheric clouds events: lidar backscatter of particulate matter and temperature in antarctic stratosphere,** *Meteorological Society of Japan. Journal,* Jan. 1991 69(1), p.71-81, With Japanese summary. 37 refs.

Two different types of aerosols were observed during Polar Stratospheric Clouds (PSCs) events at Showa Station using a lidar. Thermodynamical discussion on particle forms in the antarctic winter stratosphere suggests that these two types were possibly nitric acid trihydrated (NAT) crystal and ice crystal, and in the early stage of a PSC event most of the particles are NAT; in the fully developed stage the major component is ice crystals. Early stage PSCs sometimes contained an ice crystal particle layer, possibly due to water vapor input from the troposphere; the ice particles appear without nucleation on NAT particles. The region where PSCs particles can actively form expanded to the tropopause in the fully developed stage of PSCs. Particle descent from the stratosphere to the troposphere is certainly active under such conditions, hence this motion is an important sink of stratospheric particulate matter and related gases. Denitrification of the stratosphere due to these factors will be an important process in influencing antarctic ozone. (Auth. mod.)

I-45614
Raschke, E., Bauer, P., Lutz, H.J., **Remote sensing of clouds and surface radiation budget over polar regions,** *International journal of remote sensing,* Jan. 10, 1992 13(1), p.13-22, 20 refs.

This paper shows that clouds can be monitored over the polar regions with respect to their occurrence and water phase, using the multispectral data of the AVHRR onboard NOAA satellites. Estimates of cloud transmittance for the total downward solar radiation appear feasible, while no method has yet been developed to estimate the downward atmospheric radiation. (Auth. mod.)

I-45615
Bromwich, D.H., **Satellite case study of a katabatic surge along the Transantarctic Mountains,** *International journal of remote sensing,* Jan. 10, 1992 13(1), p.55-66, 16 refs.

A low-light visible/near-infrared satellite image of the Ross Ice Shelf area on Nov. 1, 1986 showed a cloud-free region along the Transantarctic Mountains from the Liv Glacier northward. The corresponding thermal infrared image indicated that the clear area was a katabatic air mass, fed by katabatic winds blowing from the main glacier valleys that dissect the Transantarctic Mountains. The cloud-free area broadened to the north and its western edge passed just to the east of Minna Bluff. The katabatic air mass crossed the edge of the Ross Ice Shelf, extended about 350 km offshore and developed cloud streets. Thus, this katabatic airstream appeared to propagate horizontally for over 1300 km. Analyses are presented of its association with the regional atmospheric circulation, of its time evolution and of its probable impact on the sea ice cover over the Ross Sea. Aspects of the governing dynamics are discussed. (Auth. mod.)

I-45616
Kikuchi, T., **Wind and temperature regime in Mizuho Plateau, East Antarctica,** *International journal of remote sensing,* Jan. 10, 1992 13(1), p.67-79, 22 refs.

Japanese Antarctic Research Expeditions have conducted a series of oversnow traverses in Mizuho Plateau, East Antarctica. Data have been collected on the annual mean temperatures, which are inferred from 10 m depth snow temperatures, and on the prevailing wind directions, which are inferred from the snow surface reliefs. Data from the ground- based observations have been combined with remotely sensed data both from satellites and aircraft. Annually averaged NOAA channel 5 brightness temperatures correlate well with the 10 m snow temperatures. The synthesized prevailing windfield shows a clear distinction between the katabatic wind system and that of the synoptic disturbances. Confluence zones are also identified, but their presence seems only intermittent. A slight but significant climate difference has been observed between ridges and troughs of the plateau due to the difference in katabatic wind forces. (Auth.)

I-45617
Turner, J., Ellrott, H., **High-latitude moisture structure determined from HIRS water vapour imagery,** *International journal of remote sensing,* Jan. 10, 1992 13(1), p.81-95, 15 refs.

An atmospheric transmittance model has been applied to antarctic radiosonde ascents in order to examine the high- latitude normalized weighting functions of the water vapor channels on the High Resolution Infrared Radiation Sounder. In the antarctic coastal region the 6.7 micron radiances are shown to be largely atmospheric in origin, and imagery created from these data can provide useful diagnostic information on tropospheric water vapor, even during the winter months. The 7.3 micron data contain a large surface contribution and have less value as a diagnostic tool. An example is shown of HIRS water vapor imagery of the Antarctic at a time when a cold front was descending from the Antarctic Plateau to the coastal area. The imagery clearly showed the dry air behind the front and provided information that was not available with any other imagery channel. A second example of a North Atlantic polar low shows the contaminating effect of cloud when deep atmospheric systems are being examined. (Auth. mod.)

I-45618
Ebert, E.E., **Pattern recognition analysis of polar clouds during summer and winter,** *International journal of remote sensing,* Jan. 10, 1992 13(1), p.97-109, 28 refs.

A pattern recognition algorithm is demonstrated which classifies eighteen surface and cloud types in high-latitude AVHRR imagery based on several spectral and textural features, then estimates the cloud properties (fractional coverage, albedo, and brightness temperature) using a hybrid histogram and spatial coherence technique. The summertime version of the algorithm uses both visible and infrared data (AVHRR channels 1-4), while the wintertime version uses only infrared data (AVHRR channels 3- 5). Three days of low-resolution AVHRR imagery from the Arctic and Antarctic during Jan. and July 1984 were analyzed for cloud type and fractional coverage. The analysis showed significant amounts of high cloudiness in the Arctic during one day in winter. The antarctic summer scene was characterized by heavy cloud cover in the southern ocean and relatively clear conditions in the continental interior. A large region of extremely low brightness temperatures in East Antarctica during winter suggests the presence of polar stratospheric cloud. (Auth.)

I-45619
Yamanouchi, T., Kawaguchi, S., **Cloud distribution in the Antarctic from AVHRR data and radiation measurements at the surface,** *International journal of remote sensing,* Jan. 10, 1992 13(1), p.111-127, 20 refs.

Cloud distributions were analyzed from the AVHRR data of the NOAA satellite received at Showa Station in Antarctica. Algorithms to derive cloud amount using the brightness temperature difference of infrared channels 3 and 4, or 4 and 5 were assessed by comparing the satellite cloud amount to the manual cloud amount and the downward longwave radiation at the ground surface. Cloud amounts obtained by the brightness temperature difference of channels 3 and 4 in summer agreed with the manual cloud amounts at the surface, and were highly correlated with the downward longwave fluxes. Cloud amounts from channels 4 and 5 showed a rough agreement with the surface cloud amounts. Distributions of cloud derived from the pilot datasets were examined. (Auth. mod.)

I-45620
Claud, C., Scott, N.A., Chedin, A., **Use of TOVS observations for the study of polar and arctic lows,** *International journal of remote sensing,* Jan. 10, 1992 13(1), p.129-139, 12 refs.

Global observations from the satellites of the TIROS- N/NOAA series over polar regions, where the *in situ* measurements are scarce, constitute a valuable source for the study of mesoscale meteorological phenomena after conversion of these observations to atmospheric and surface parameters. The 3I (Improved Initialization Inversion) system, which relies on a pattern-recognition-type approach, has been applied to NOAA-9 and NOAA-10 passes of both hemispheres and at different periods of the year. Results show that the 3I method is able to identify cyclonic conditions. Comparisons between retrieved products and conventional products show a good agreement. The first assimilation experiments of 3I temperature profiles into a fine mesh model seem promising. (Auth. mod.)

I-45621
Lachlan-Cope, T.A., **Use of a simultaneous physical retrieval scheme for satellite derived atmospheric temperatures: Weddell Sea, Antarctica,** *International journal of remote sensing,* Jan. 10, 1992 13(1), p.141-154, 10 refs.

Atmospheric temperature retrievals obtained by a simultaneous physical scheme and a statistical scheme are compared using data gathered over the Weddell Sea during Jan. 1986. Ground truth data were obtained from radiosonde ascents. The statistical approach gave errors smaller than those of the physical method. Several modifications to the physical scheme were tried but, although some individual retrievals did show an improvement, the errors were still greater than for the statistical scheme. The results are for retrievals over the sea or low-lying coast; it is expected that the physical scheme will give better results than the statistical scheme over the high antarctic plateau, as it allows for the effect of ground elevation in the temperature profile determination. (Auth.)

I-45623
Speth, P., May, W., Madden, R.A., **Average behavior of large-scale westward-travelling disturbances evident in the Southern Hemisphere geopotential heights,** *Journal of the atmospheric sciences,* Jan. 15, 1992 49(2), p.178-185, 15 refs.

The procedures followed in an earlier paper (Madden and Speth, 1989 (MS) are used to define the three-dimensional structure of disturbances responsible for relative maxima in the westward space-time spectra of zonal wave-number one near 16 days. In MS, focus was on peaks evident at 250 hPa and 60N, while here it is concentrated on those evident at 250 hPa and 60S. Westward propagation was evident at 60S from approximately 16% (DJF) to 28% (JJA) of the time, and average periods ranged from 13 (SON) to 17 (DJF and JJA) days. Similar results reported in MS for 60N indicated westward propagation evident from about 27% (SON) to 38% (DJF) of the time. Average periods at 60N were from 16 (MAM and JJA) to 20 (DJF) days. The disturbances tend to be more prevalent and reflect slightly longer periods at 60N than at 60S. Average durations of episodes may be slightly longer at 60N (15 days during MAM and SON to 23 days during DJF) than at 60S (14 days during MAM to 18 days during JJA). (Auth. mod.)

I-45629

Vsesoiuznyĭ simpozium "Meteorologicheskie issledovaniia v Antarktike," 3rd, Leningrad, Oct. 22-24, 1986, Korotkevich, E.S., ed, **Meteorological investigations in the Antarctic. Collection of papers** [Meteorologicheskie issledovaniia v Antarktike. Sbornik dokladov], Leningrad, Gidrometeoizdat, 1990, 232p., In Russian. Refs. passim. For individual papers see F-45636, F-45646, F-45657, I-45630 through I-45635, I-45637 through I-45645, I-45647 through I-45656 and I-45658 through I- 45681.

This is a collection of papers from climatic investigations in the Antarctic over a period of 30 years. The studies reported cover climatic variations, monitoring, and atmospheric structures and circulation in the Southern Hemisphere.

I-45630

Korotkevich, E.S., **International cooperation in the study of antarctic climate** [Mezhdunarodnoe sotrudnichestvo v izuchenii klimata Antarktiki], Vsesoiuznyĭ simpozium "Meteorologicheskie issledovaniia v Antarktike," 3rd, Leningrad, Oct. 22-24, 1986. Sbornik dokladov (All-Union Symposium "Meteorological investigations in the Antarctic", 3rd, Leningrad, Oct. 22-24, 1986. Proceedings). Vol.1, Leningrad, Gidrometeoizdat, 1990, p.4-6, In Russian.

The history of the organization and development of meteorological investigations in the south polar region is briefly reviewed. Achievements in the study of antarctic climate, carried out by different nations in the last decades and in the framework of the Antarctic Treaty, are summarized. The important role antarctic research plays in monitoring global air and water pollution caused by man is pointed out.

I-45631

Voskresenskiĭ, A.I., **Role of the Antarctic in world climate programs** [Rol' Antarktiki vo Vsemirnoĭ klimaticheskoi programme], Vsesoiuznyĭ simpozium "Meteorologicheskie issledovaniia v Antarktike," 3rd, Leningrad, Oct. 22-24, 1986. Sbornik dokladov (All-Union Symposium "Meteorological investigations in the Antarctic", 3rd, Leningrad, Oct. 22-24, 1986. Proceedings). Vol.1, Leningrad, Gidrometeoizdat, 1990, p.6-9, In Russian. 4 refs.

In this evaluation of the role the Antarctic plays in the formation of world climate, emphasis is on factors governing the climate and atmospheric circulation in south polar regions, such as atmospheric heat loss and the seasonal progress of the southern ocean ice cover, bringing about seasonal variations of the solar radiation impact. The Antarctic is considered ideal for climate monitoring and assessment of the interaction of various atmospheric systems—ocean, dry land, cryosphere and biosphere.

I-45632

Petrov, L.S., **New data on the south polar region climate in the Antarctic Atlas** [Novye dannye o klimate iuzhnoĭ poliarnoĭ oblasti v Atlase Antarktiki], Vsesoiuznyĭ simpozium "Meteorologicheskie issledovaniia v Antarktike," 3rd, Leningrad, Oct. 22-24, 1986. Sbornik dokladov (All-Union Symposium "Meteorological investigations in the Antarctic", 3rd, Leningrad, Oct. 22-24, 1986. Proceedings). Vol.1, Leningrad, Gidrometeoizdat, 1990, p.9-12, In Russian. 2 refs.

The structure and contents of the section on climate in the updated new edition of the Antarctic Atlas are discussed. Compared to the edition of 1966, the new Atlas offers considerably more information, containing a number of new climatic parameters, three-dimensional images of principal meteorological fields, and new data on the variability and extremes of meteorological elements.

I-45633

Marshunova, M.S., **Radiation climate in the Antarctic** [Radiatsionnyĭ klimat Antarktiki], Vsesoiuznyĭ simpozium "Meteorologicheskie issledovaniia v Antarktike," 3rd, Leningrad, Oct. 22-24, 1986. Sbornik dokladov (All-Union Symposium "Meteorological investigations in the Antarctic", 3rd, Leningrad, Oct. 22-24, 1986. Proceedings). Vol.1, Leningrad, Gidrometeoizdat, 1990, p.12-16, In Russian. 11 refs.

Results from studies on the radiation regime of the south polar surface area and atmosphere in the last 30 years are discussed. The determination of the radiation regime is based on observations of research vessels cruising in the southern ocean and current data on the distribution of clouds and ice in the region. Maps showing total solar radiation and radiation balance are presented.

I-45634

Voskresenskiĭ, A.I., **Current concepts of the climate of antarctic free atmosphere** [Sovremennye predstavleniia o klimate svobodnoĭ atmosfery Antarktidy], Vsesoiuznyĭ simpozium "Meteorologicheskie issledovaniia v Antarktike," 3rd, Leningrad, Oct. 22-24, 1986. Sbornik dokladov (All-Union Symposium "Meteorological investigations in the Antarctic", 3rd, Leningrad, Oct. 22-24, 1986. Proceedings). Vol.1, Leningrad, Gidrometeoizdat, 1990, p.16-21, In Russian. 5 refs.

Basic properties of long-term variations in temperature, geopotential and wind of the antarctic troposphere and stratosphere are discussed. The changes of integral atmospheric moisture content and linear trends of basic climatic elements of the free atmosphere, for the period 1960-1985, are calculated.

I-45635

Vinnikov, K.IA., Groĭsman, P.IA., Lugina, K.M., Golubev, A.A., **Role of the Southern Hemisphere and its different latitudinal zones in current changes of global thermal regime** [Vklad iuzhnogo polushariia i ego razlichnykh shirotnykh zon v sovremennye izmeneniia global'nogo termicheskogo rezhima], Vsesoiuznyĭ simpozium "Meteorologicheskie issledovaniia v Antarktike," 3rd, Leningrad, Oct. 22-24, 1986. Sbornik dokladov (All-Union Symposium "Meteorological investigations in the Antarctic", 3rd, Leningrad, Oct. 22-24, 1986. Proceedings). Vol.1, Leningrad, Gidrometeoizdat, 1990, p.22-26, In Russian. 7 refs.

An evaluation is presented, based on data from 176 meteorological stations in the Southern Hemisphere, of variations of the mean annual surface air temperature in the 0-30 and 30-60S zones, for the period 1881-1984, and in the 60-90S zone for the period 1957-1984. The above freezing air temperature trend observed in the 0-60S zone, amounting to about 0.4 C for 100 years, determines the global character of climatic warming in modern times.

I-45637

Briazgin, N.N., **Atmospheric precipitation in Antarctica and its long- term variability** [Atmosfernye osadki v Antarktide i ikh mnogoletniaia izmenchivost'], Vsesoiuznyĭ simpozium "Meteorologicheskie issledovaniia v Antarktike," 3rd, Leningrad, Oct. 22-24, 1986. Sbornik dokladov (All-Union Symposium "Meteorological investigations in the Antarctic", 3rd, Leningrad, Oct. 22-24, 1986. Proceedings). Vol.1, Leningrad, Gidrometeoizdat, 1990, p.30-34, In Russian. 6 refs.

Different methods for the correction of atmospheric precipitation data are investigated. The variability in monthly totals of precipitation at antarctic stations is analyzed. The dependence of statistical characteristics of precipitations on their calendar duration is determined, which permits one to assess the accuracy of the precipitation monthly total values. The increasing trend of precipitation is measured from the long- term fluctuations. A direct relation is found between increasing air temperature and precipitation volume.

I-45638

Briazgin, N.N., Saraeva, S.V., Sharova, V.IA., **Frequency of precipitation in the Antarctic** [Povtoriaemost' osadkov v Antarktike], Vsesoiuznyĭ simpozium "Meteorologicheskie issledovaniia v Antarktike," 3rd, Leningrad, Oct. 22-24, 1986. Sbornik dokladov (All-Union Symposium "Meteorological investigations in the Antarctic", 3rd, Leningrad, Oct. 22-24, 1986. Proceedings). Vol.1, Leningrad, Gidrometeoizdat, 1990, p.34-40, In Russian. 5 refs.

Various methods for assessing the frequency of atmospheric precipitation over Antarctica and surrounding oceans are investigated. The resulting maps and charts, with values for the months of Jan., Apr., July and Oct. obtained at 7 Soviet stations, are analyzed to determine the mechanism of precipitation distribution. It is found that the lowest frequency values are recorded in the coastal regions and on slopes, the highest over the oceans.

I-45639

Burova, L.P., Voskresenskiĭ, A.I., **Assessment of long-term variations of the integral atmospheric moisture content over Antarctica** [Otsenka mnogoletnikh izmeneniĭ integral'nogo vlagosoderzhaniia atmosfery nad Antarktidoĭ], Vsesoiuznyĭ simpozium "Meteorologicheskie issledovaniia v Antarktike," 3rd, Leningrad, Oct. 22-24, 1986. Sbornik dokladov (All-Union Symposium "Meteorological investigations in the Antarctic", 3rd, Leningrad, Oct. 22-24, 1986. Proceedings). Vol.1, Leningrad, Gidrometeoizdat, 1990, p.40-43, In Russian. 5 refs.

Long-term variations of atmospheric moisture content values, obtained on Soviet stations from 1959 to 1985, are analyzed. A moisture increase trend of 0.7-0.8 mm is noted for the month of Jan. on Novolazarevskaya and Mirnyy Stations. Based on these data, an estimate of the atmospheric moisture content variation over several years is obtained by linear trend.

I-45640

Voskresenskiĭ, A.I., Emshanova, N.V., **Optimal regimes for the utilization of climatic energy resources of the antarctic littoral** [O klimaticheskikh energoresursakh antarkticheskogo poberezh'ia v optimal'nom rezhime ikh ispol'zovaniia], Vsesoiuznyĭ simpozium "Meteorologicheskie issledovaniia v Antarktike," 3rd, Leningrad, Oct. 22-24, 1986. Sbornik dokladov (All-Union Symposium "Meteorological investigations in the Antarctic", 3rd, Leningrad, Oct. 22-24, 1986. Proceedings). Vol.1, Leningrad, Gidrometeoizdat, 1990, p.43-46, In Russian. 5 refs.

The complexities and instruments involved in the utilization of coastal wind and solar energy are considered. Energy losses of the wind flow entering the conversion system, during the regime best suited for optimum exploitation of the wind energy, are assessed.

I-45641

Dolgin, M.I., **Radiant heat transfer in the antarctic atmosphere** [Luchistyĭ teploobmen v atmosfere Antarktidy], Vsesoiuznyĭ simpozium "Meteorologicheskie issledovaniia v Antarktike," 3rd, Leningrad, Oct. 22-24, 1986. Sbornik dokladov (All-Union Symposium "Meteorological investigations in the Antarctic", 3rd, Leningrad, Oct. 22-24, 1986. Proceedings). Vol.1, Leningrad, Gidrometeoizdat, 1990, p.46-50, In Russian. 6 refs.

Based on numerical estimates of the effect of clouds on the formation of long-wave radiation, computed results of atmospheric radiation regime characteristics are presented.

I-45642

Zav'ialova, I.N., Zhukova, O.L., **Multiyear cloudiness variability in Antarctica** [O mnogoletneĭ izmenchivosti oblachnosti v Antarktide], Vsesoiuznyĭ simpozium "Meteorologicheskie issledovaniia v Antarktike," 3rd, Leningrad, Oct. 22-24, 1986. Sbornik dokladov (All-Union Symposium "Meteorological investigations in the Antarctic", 3rd, Leningrad, Oct. 22-24, 1986. Proceedings). Vol.1, Leningrad, Gidrometeoizdat, 1990, p.51-54, In Russian. 4 refs.

Cloudiness regime characteristics, based on data obtained at Soviet antarctic stations in 1970, are compared with similar data obtained in 1982. Results show the absence of a trend in average cloudiness variations in East Antarctica, an insignificant positive trend in Central Antarctica, and an insignificant negative trend in West Antarctica.

I-45643

Zav'ialova, I.N., Mart'ianov, V.L., Petrov, L.S., **Comparison of methods for evaluation of climate severity in Antarctica** [Sravnitel'naia kharakteristika metodov otsenki surovosti klimata Antarktidy], Vsesoiuznyĭ simpozium "Meteorologicheskie issledovaniia v Antarktike," 3rd, Leningrad, Oct. 22-24, 1986. Sbornik dokladov (All-Union Symposium "Meteorological investigations in the Antarctic", 3rd, Leningrad, Oct. 22-24, 1986. Proceedings). Vol.1, Leningrad, Gidrometeoizdat, 1990, p.55-58, In Russian. 2 refs.

Various methods for evaluating the severity of meteorological conditions in Antarctica are examined. The wind speed, relative humidity, atmospheric temperature and pressure at different locations are considered. A map showing the average annual climate inclemencies based on the Bodman formula, and the severity indexes for 16 antarctic stations, obtained by the Belkin and Etin method, are presented. All methods are found useful; no specific general method was found.

I-45644
Mart'ianov, V.L., **Climatic properties of West Antarctica (from data obtained at Russkaya Station and during the RV *Mikhail Somov* drift)** [Osobennosti klimata Zapadnoĭ Antarktidy (po dannym nabliudeniĭ stantsii Russkoĭ i dreĭfa nes "Mikhail Somov")], Vsesoiuznyĭ simpozium "Meteorologicheskie issledovaniia v Antarktike," 3rd, Leningrad, Oct. 22-24, 1986. Sbornik dokladov (All-Union Symposium "Meteorological investigations in the Antarctic", 3rd, Leningrad, Oct. 22-24, 1986. Proceedings). Vol.1, Leningrad, Gidrometeoizdat, 1990, p.58-63, In Russian. 4 refs.

Based on satellite information, observations from meteorological station networks, and data obtained on the *Mikhail Somov* during Mar.-July 1985, the properties of antarctic atmospheric circulation and climate in the vicinity of Russkaya Station are discussed. Tabulated results are presented. The prevailing temperature at Russkaya was found to be similar to that of other coastal antarctic stations: the average atmospheric pressure values are low; the average annual wind speed is 13.4 m/s.

I-45645
Mart'ianov, V.L., Prakhov, A.N., **Prevailing surface wind in Antarctica** [Preobladaiushchiĭ veter y poverkhnosti zemli v Antarktide], Vsesoiuznyĭ simpozium "Meteorologicheskie issledovaniia v Antarktike," 3rd, Leningrad, Oct. 22-24, 1986. Sbornik dokladov (All-Union Symposium "Meteorological investigations in the Antarctic", 3rd, Leningrad, Oct. 22-24, 1986. Proceedings). Vol.1, Leningrad, Gidrometeoizdat, 1990, p.63-67, In Russian. 9 refs.

Based on an analysis of complex climatic and circulation factors, a plan of the vector spatial distribution of prevailing antarctic surface winds is developed. Considering the effects of katabatic and cyclonic processes, 12 zones are established which reflect all basic types of wind conditions in Antarctica.

I-45647
Petrov, L.S., **Method of utilizing short-term observations at antarctic stations for climate mapping** [O metodike ispol'zovaniia korotkoriadnykh nabliudeniĭ antarkticheskikh stantsiĭ dlia klimaticheskogo kartirovaniia], Vsesoiuznyĭ simpozium "Meteorologicheskie issledovaniia v Antarktike," 3rd, Leningrad, Oct. 22-24, 1986. Sbornik dokladov (All-Union Symposium "Meteorological investigations in the Antarctic", 3rd, Leningrad, Oct. 22-24, 1986. Proceedings). Vol.1, Leningrad, Gidrometeoizdat, 1990, p.71-73, In Russian.

Possible errors in climate mapping of Antarctica, based on 5-year meteorological data from various antarctic stations, are evaluated and found to be minimal.

I-45648
Rodionov, I.N., **Practical use of meteorological data in solving problems of introducing wind generators in Antarctica** [Prakticheskoe ispol'zovanie meteorologicheskikh issledovaniĭ dlia resheniia problemy vnedreniia vetroenergeticheskikh ustanovok v Antarktide], Vsesoiuznyĭ simpozium "Meteorologicheskie issledovaniia v Antarktike," 3rd, Leningrad, Oct. 22-24, 1986. Sbornik dokladov (All-Union Symposium "Meteorological investigations in the Antarctic", 3rd, Leningrad, Oct. 22-24, 1986. Proceedings). Vol.1, Leningrad, Gidrometeoizdat, 1990, p.73-76, In Russian. 2 refs.

Meteorological data is found to be essential in determining the feasibility of utilization of serial wind generators; for the development of new, and modernization of already operating, wind generators; for optimal selection of calculated wind speed, the established nominal power of the generators, maximum annual performance of the electric power, and the organization of technical servicing. Data on the serial wind-generator AVZU6-4, operating at Novolazarevskaya Station, and recommendations for its modernization, are presented.

I-45649
Chepurina, M.A., **Use of autoregressive models for objective evaluation of the climate seasonal demarcation in Antarctica** [K voprosu ob ispol'zovanii avtoregressionnykh modeleĭ dlia ob"ektivnoĭ otsenki granits klimaticheskikh sezonov v Antarktide], Vsesoiuznyĭ simpozium "Meteorologicheskie issledovaniia v Antarktike," 3rd, Leningrad, Oct. 22-24, 1986. Sbornik dokladov (All-Union Symposium "Meteorological investigations in the Antarctic", 3rd, Leningrad, Oct. 22-24, 1986. Proceedings). Vol.1, Leningrad, Gidrometeoizdat, 1990, p.77-81, In Russian. 2 refs.

Based on parametric spectral analysis, the statistical structure of surface meteorological data is studied for the compilation of autoregressive models, and their use in forecasting at Molodezhnaya and Macquarie I. stations. The models are found useful in determining climate seasonal demarcations.

I-45650
Liubarskiĭ, A.N., Zhukova, O.L., **Conditions for the development of inter-monthly, inter-seasonal and interannual variations of antarctic atmospheric temperature** [Usloviia formirovaniia mezhmesiachnykh, mezhsezonnykh i mezhgodovykh izmeneniĭ temperatury vozdukha v Antarktide], Vsesoiuznyĭ simpozium "Meteorologicheskie issledovaniia v Antarktike," 3rd, Leningrad, Oct. 22-24, 1986. Sbornik dokladov (All-Union Symposium "Meteorological investigations in the Antarctic", 3rd, Leningrad, Oct. 22-24, 1986. Proceedings). Vol.1, Leningrad, Gidrometeoizdat, 1990, p.81-85, In Russian. 10 refs.

Analysis of the temporal and correlation structure of inter-monthly, inter-seasonal and interannual variations of atmospheric temperature at antarctic stations shows a close relationship between summer temperatures and the values of the incoming direct solar radiation on a horizontal surface. The prevailing influence of the general atmospheric circulation on the antarctic thermal regime in winter is also noted.

I-45651
Sakunov, G.G., Mishin, A.A., Sveshnikov, A.M., Barteneva, O.D., **Aerosol and optical atmospheric characteristics over Antarctica** [Aerozol'no-opticheskie kharakteristiki atmosfery nad Antarktidoĭ], Vsesoiuznyĭ simpozium "Meteorologicheskie issledovaniia v Antarktike," 3rd, Leningrad, Oct. 22-24, 1986. Sbornik dokladov (All-Union Symposium "Meteorological investigations in the Antarctic", 3rd, Leningrad, Oct. 22-24, 1986. Proceedings). Vol.1, Leningrad, Gidrometeoizdat, 1990, p.86-89, In Russian. 3 refs.

The spectral progress of aerosol optical thickness of the antarctic summer atmosphere, measured by 5 Soviet antarctic expeditions between the years 1969 and 1986, is discussed and illustrated. Transparency integral coefficient values—long term averages, and values obtained at Molodezhnaya, Mirnyy and Vostok Stations during Nov.-Dec. 1984, Jan.-Mar. 1985, and Jan.-Feb. 1985, respectively—are presented in a table.

I-45652
Voskresenskiĭ, A.I., **Atmospheric carbon monoxide, methane, and nitrous oxide in Antarctica** [Okis' ugleroda, metan i zakis' azota v atmosfere Antarktidy], Vsesoiuznyĭ simpozium "Meteorologicheskie issledovaniia v Antarktike," 3rd, Leningrad, Oct. 22-24, 1986. Sbornik dokladov (All-Union Symposium "Meteorological investigations in the Antarctic", 3rd, Leningrad, Oct. 22-24, 1986. Proceedings). Vol.1, Leningrad, Gidrometeoizdat, 1990, p.90-93, In Russian. 11 refs.

Tabulated results and graphs of measurements of atmospheric carbon monoxide (CO), methane (CH4) and nitrous oxide (N2O), obtained at Molodezhnaya and Mirnyy Stations between 1977 and 1986, are presented. The seasonal pattern of CO content shows that minimal values are recorded in Jan. and Feb.; CH4 and N2O show no seasonal pattern within a measurement error of +/- 6- 8%. No significant increase in concentrations of the above gases is found for the last 8 years, with maximum changes not over 1% per annum.

I-45653
Karimova, G.U., **Variation trends of atmospheric ozone in Antarctica** [Tendentsii izmeneniĭ ozonosfery Antarktidy], Vsesoiuznyĭ simpozium "Meteorologicheskie issledovaniia v Antarktike," 3rd, Leningrad, Oct. 22-24, 1986. Sbornik dokladov (All-Union Symposium "Meteorological investigations in the Antarctic", 3rd, Leningrad, Oct. 22-24, 1986. Proceedings). Vol.1, Leningrad, Gidrometeoizdat, 1990, p.94-98, In Russian. 8 refs.

From analysis of long-period daily averages of total ozone content, an autumn variation trend in the last few years is observed. It is pointed out that this phenomenon, accompanied by a significant cooling of stratospheric lower layers, occurred against a background of natural circulation variations over the last 5 years. Data on ozone vertical distribution in the "hole" area in the spring of 1985 at Novolazarevskaya Station include the lowest ozone values recorded at any time or place in Antarctica.

I-45654
Voskresenskiĭ, A.I., Baranov, G.I., Liubarskiĭ, A.N., **Approximate evaluation of climatic system susceptibility to its radiation parameters in the Golitsyn- Ginzburg model** [Priblizhennaia otsenka chuvstvitel'nosti klimaticheskoĭ sistemy k ee radiatsionnym parametram v modeli Golitsyna-Ginzburga], Vsesoiuznyĭ simpozium "Meteorologicheskie issledovaniia v Antarktike," 3rd, Leningrad, Oct. 22-24, 1986. Sbornik dokladov (All-Union Symposium "Meteorological investigations in the Antarctic", 3rd, Leningrad, Oct. 22-24, 1986. Proceedings). Vol.1, Leningrad, Gidrometeoizdat, 1990, p.98-101, In Russian. 4 refs.

Using a simple Golitsyn-Ginzburg model of the global thermal regime, the susceptibility of the climatic system to basic radiation parameters is evaluated. It is found that the climatic system is least susceptible to the integral function of transmission, and most susceptible to the incoming radiation, at the upper atmospheric boundary. Variations of relative susceptibility of the climatic system induced by snow and ice edge variations are calculated for the last 75,000 years.

I-45655
Belov, B.A., Gordiuk, V.P., Saetov, R.M., **Measuring atmospheric electrical properties over Mirnyy Station** [Rezul'taty izmereniĭ elektricheskikh kharakteristik atmosfery na antarkticheskoĭ stantsii Mirnyĭ], Vsesoiuznyĭ simpozium "Meteorologicheskie issledovaniia v Antarktike," 3rd, Leningrad, Oct. 22-24, 1986. Sbornik dokladov (All-Union Symposium "Meteorological investigations in the Antarctic", 3rd, Leningrad, Oct. 22-24, 1986. Proceedings). Vol.1, Leningrad, Gidrometeoizdat, 1990, p.102-106, In Russian. 4 refs.

Results of measuring electrical conductivity and gradient of the atmospheric electrical field, obtained for the years 1981-1986 at Mirnyy Station, are presented. Selected data indicating absence of atmospheric phenomena are used for the determination of trends in electrical property changes.

I-45656
Burova, L.P., Luk'ianchikova, N.I., Gromov, V.D., Sholomitskiĭ, G.B., **Moisture content and submillimetric atmospheric transparency over Vostok Station** [O vlagosoderzhanii i submillimetrovoĭ prozrachnosti atmosfery nad antarkticheskoĭ stantsieĭ Vostok], Vsesoiuznyĭ simpozium "Meteorologicheskie issledovaniia v Antarktike," 3rd, Leningrad, Oct. 22-24, 1986. Sbornik dokladov (All-Union Symposium "Meteorological investigations in the Antarctic", 3rd, Leningrad, Oct. 22-24, 1986. Proceedings). Vol.1, Leningrad, Gidrometeoizdat, 1990, p.106-110, In Russian. 4 refs.

Calculated results of integral atmospheric moisture content under cloudless conditions are used in prognosis of atmospheric transparency, in the submillimeter wave length range, as astrophysical data in the Vostok area.

I-45658

Dolgin, M.I., Radionov, V.F., Rozanov, E.V., **Effect of aerosols on solar radiation transfer in the antarctic atmosphere** [Vliianie aerozolia na perenos solnechnoĭ radiatsii v atmosfere Antarktidy], Vsesoiuznyĭ simpozium "Meteorologicheskie issledovaniia v Antarktike," 3rd, Leningrad, Oct. 22-24, 1986. Sbornik dokladov (All-Union Symposium "Meteorological investigations in the Antarctic", 3rd, Leningrad, Oct. 22-24, 1986. Proceedings). Vol.1, Leningrad, Gidrometeoizdat, 1990, p.115-119, In Russian. 8 refs.

Based on measurements of aerosol content in the atmosphere over coastal antarctic stations, calculations showed no significant effect of aerosols on solar radiation flux or atmospheric thermal regime.

I-45659

Sakunov, G.G., Barteneva, O.D., **Indices of light scattering and horizontal transparency of antarctic surface boundary layer** [Indikatrisy rasseianiia sveta i gorizontal'naia prozrachnost' prizemnogo sloia atmosfery Antarktidy], Vsesoiuznyĭ simpozium "Meteorologicheskie issledovaniia v Antarktike," 3rd, Leningrad, Oct. 22-24, 1986. Sbornik dokladov (All-Union Symposium "Meteorological investigations in the Antarctic", 3rd, Leningrad, Oct. 22-24, 1986. Proceedings). Vol.1, Leningrad, Gidrometeoizdat, 1990, p.119-123, In Russian. 5 refs.

In order to measure the volumetric aerosol scattering coefficient, the nephelometer NF-14 was used at Mirnyy Station from Mar. to Oct. 1983 and Mar. and Apr. 1985. Visibility ranged between 50 and 240 km; the relative humidity, 60-90%. Two hundred and nine indices of light scattering in the surface layer of the atmosphere were obtained and analyzed. Their classification and distribution are presented in tables.

I-45660

Chukanin, K.I., Kotova, N.M., **Variations in antarctic atmospheric geopotential for the period 1958-1985** [Izmenenie geopotentsiiala v atmosfere Antarktidy za period 1958-1985 gg], Vsesoiuznyĭ simpozium "Meteorologicheskie issledovaniia v Antarktike," 3rd, Leningrad, Oct. 22-24, 1986. Sbornik dokladov (All-Union Symposium "Meteorological investigations in the Antarctic", 3rd, Leningrad, Oct. 22-24, 1986. Proceedings). Vol.1, Leningrad, Gidrometeoizdat, 1990, p.124-128, In Russian.

Data on geopotential fluctuations between Jan. and July and differences in geopotential values in the periods 1958- 1969, 1958-1980, and 1958-1985 are presented. Temporal variations of mean annual values in different antarctic areas are determined for the period 1958-1980. It is found that during the spring circulation buildup in the lower stratosphere, the geopotential variations have a focal character. At that time, the greatest growth of the geopotential takes place in the focus located in the Australian sector of the Antarctic.

I-45661

Todrashevich, A.P., **Temperature and wind variations in the spring buildup of the free atmosphere** [Osobennosti izmeneniĭ temperatury i vetra v period vesennikh perestroek v svobodnoĭ atmosfere Antarktidy], Vsesoiuznyĭ simpozium "Meteorologicheskie issledovaniia v Antarktike," 3rd, Leningrad, Oct. 22-24, 1986. Sbornik dokladov (All-Union Symposium "Meteorological investigations in the Antarctic", 3rd, Leningrad, Oct. 22-24, 1986. Proceedings). Vol.1, Leningrad, Gidrometeoizdat, 1990, p.128-131, In Russian. 5 refs.

Data from temperature and wind radio soundings, carried out at Mirnyy Station during 22 springs, are analyzed. It is found that the process of spring buildup of atmospheric temperature and wind fields in that area occurs with different intensity in different years. For the period analyzed, the date of the beginning of the spring buildup tended to shift toward winter, lasting 16 days; the date of the end of spring warming shifted toward summer, lasting 25 days. In recent years, the duration of the spring buildup has increased.

I-45662

Tsigel'nitskiĭ, I.I., **Long-period fluctuations of surface air temperature inversion characteristics in Antarctica** [Dolgoperiodnye kolebaniia kharakteristik prizemnoĭ inversii temperatury vozdukha v Antarktide], Vsesoiuznyĭ simpozium "Meteorologicheskie issledovaniia v Antarktike," 3rd, Leningrad, Oct. 22-24, 1986. Sbornik dokladov (All-Union Symposium "Meteorological investigations in the Antarctic", 3rd, Leningrad, Oct. 22-24, 1986. Proceedings). Vol.1, Leningrad, Gidrometeoizdat, 1990, p.132-135, In Russian. 6 refs.

Based on daily data from aerological soundings at Vostok Station during the months of June-Aug., several years standing variations of magnitude, depth and intensity of surface temperature inversion for 1958-1982 are studied. Calculations confirm that, against a background of increased air temperature on the ice cover surface, the magnitude of the inversion for the period investigated decreased, while the depth and intensity increased. The relationship between the stage of surface inversion development and atmospheric processes is discussed.

I-45663

Bogatkin, O.G., Tsigel'nitskiĭ, I.I., **Mesojet streams—wind regime properties in the surface boundary layer over Antarctica** [Mezostruĭnye techeniia—kharakternaia osobennost' vetrovogo rezhima pogranichnogo sloia atmosfery nad Antarktidoĭ], Vsesoiuznyĭ simpozium "Meteorologicheskie issledovaniia v Antarktike," 3rd, Leningrad, Oct. 22-24, 1986. Sbornik dokladov (All-Union Symposium "Meteorological investigations in the Antarctic", 3rd, Leningrad, Oct. 22-24, 1986. Proceedings). Vol.1, Leningrad, Gidrometeoizdat, 1990, p.136-140, In Russian. 7 refs.

Based on data from aerological soundings of the atmosphere, carried out at Soviet stations between 1974 and 1983, the structure of wind profiles in the lower troposphere is determined. Quantitative values are obtained for frequency, axis position, speed, direction and other characteristics of mesojet streams. The conditions for their formation on the coast and in the interior of the continent are analyzed. The interrelationship between wind speed at the mesojet axis and the speed over the ice cover surface is determined. It is found that mesojet streams are a characteristic feature of the wind regime and climate of the lower troposphere and the surface boundary layer. It is recommended that the data obtained be used to provide safer air navigation in Antarctica.

I-45664
Maurits, S.A., Shirochkov, A.V., **Effect of magnetic activity on the parameters of neutral atmosphere central layers at high latitudes** [Vliianie magnitnoĭ aktivnosti na parametry srednikh sloev neĭtral'noĭ atmosfery vysokikh shirot], Vsesoiuznyĭ simpozium "Meteorologicheskie issledovaniia v Antarktike," 3rd, Leningrad, Oct. 22-24, 1986. Sbornik dokladov (All-Union Symposium "Meteorological investigations in the Antarctic", 3rd, Leningrad, Oct. 22-24, 1986. Proceedings). Vol.1, Leningrad, Gidrometeoizdat, 1990, p.140-143, In Russian. 5 refs.

Applicability of neutral atmosphere models MSIS-83 to the evaluation of disturbances due to bursts of geomagnetic activity in the lower atmosphere and mesosphere in polar regions is discussed. The occurrence of significant variations in the distribution of temperature and composition of the neutral atmosphere with increased levels of geomagnetic disturbances is noted. The possible mechanism of geophysical factors contributing to changes of atmospheric composition is discussed.

I-45665
Efimov, V.A., Evseev, M.P., Savitskiĭ, G.B., Lutsenko, E.I., **Results and prospects for the development of hydrometeorological forecasting services at high latitudes of the Southern Hemisphere** [Rezul'taty i perspektivy razvitiia sluzhby gidrometeorologicheskikh prognozov v vysokikh shirotakh iuzhnogo polushariia], Vsesoiuznyĭ simpozium "Meteorologicheskie issledovaniia v Antarktike," 3rd, Leningrad, Oct. 22-24, 1986. Sbornik dokladov (All-Union Symposium "Meteorological investigations in the Antarctic", 3rd, Leningrad, Oct. 22-24, 1986. Proceedings). Vol.1, Leningrad, Gidrometeoizdat, 1990, p.143-146, In Russian. 8 refs.

The principal questions concerning the development of hydrodynamic and static forecasting in hydrometeorological fields of south polar regions, with a lead of a few days or months, are discussed. The use of a spectral model of the general atmospheric circulation, and the method for correcting the model's calculations, are described.

I-45666
Matveev, L.T., Soldatenko, S.A., **Role of baroclinicity in large scale atmospheric eddy origin: numerical experiment on a beta-plane** [O roli baroklinnosti v proiskhozhdenii krupnomasshtabnykh atmosfernykh vikhreĭ: chislennyĭ eksperiment na beta-ploskosti], Vsesoiuznyĭ simpozium "Meteorologicheskie issledovaniia v Antarktike," 3rd, Leningrad, Oct. 22-24, 1986. Sbornik dokladov (All-Union Symposium "Meteorological investigations in the Antarctic", 3rd, Leningrad, Oct. 22-24, 1986. Proceedings). Vol.1, Leningrad, Gidrometeoizdat, 1990, p.146-150, In Russian. 5 refs.

A numerical model based on a two-dimensional atmospheric baroclinic model confirmed the principal qualitative rule of vortex formation in the atmosphere: that horizontal baroclinicity plays a significant role in the formation and intensity of travelling cyclones. According to numerical experiments, the horizontal advection of a cold front generates in time a cyclonic circulation in the zonal current near the separating interface of two air masses.

I-45667
Mokhov, I.I., **Evaluation of the zonal structure of the antarctic atmosphere and its annual dynamics** [Diagnostika zonal'noĭ struktury antarkticheskoĭ atmosfery i ee dinamika v godovom khode], Vsesoiuznyĭ simpozium "Meteorologicheskie issledovaniia v Antarktike," 3rd, Leningrad, Oct. 22-24, 1986. Sbornik dokladov (All-Union Symposium "Meteorological investigations in the Antarctic", 3rd, Leningrad, Oct. 22-24, 1986. Proceedings). Vol.1, Leningrad, Gidrometeoizdat, 1990, p.150-154, In Russian. 9 refs.

Based on zonally averaged mean monthly data from the troposphere, stratosphere and mesosphere of the Southern Hemisphere, the high latitudinal structure and annual characteristics of the antarctic atmosphere are analyzed. To evaluate the annual temperature, geopotential and pressure, density, and incoming radiation, the method of amplitude-phase characteristics is used. Results of empirical data analysis are comparable to those obtained in a general circulation model.

I-45668
Lagun, V.E., Romanov, V.F., IAzev, A.I., **Energetics of synoptic eddies in the Southern Hemisphere** [Energetika sinopticheskikh vikhreĭ v iuzhnom polusharii], Vsesoiuznyĭ simpozium "Meteorologicheskie issledovaniia v Antarktike," 3rd, Leningrad, Oct. 22-24, 1986. Sbornik dokladov (All-Union Symposium "Meteorological investigations in the Antarctic", 3rd, Leningrad, Oct. 22-24, 1986. Proceedings). Vol.1, Leningrad, Gidrometeoizdat, 1990, p.155-158, In Russian. 5 refs.

It is found that the inflow of oceanic internal energy during vortex formation in many respects determines further evolution of synoptic eddies. It is established that the energy regime of synoptic eddies travelling on zonal and meridional trajectories varies significantly. The assumption is made that the possible cause of meridional movement of synoptic eddies is their dynamic interaction with the main flux.

I-45669
Vangengeĭm, T.G., Fedosov, M.K., Baranov, G.I., **Role of the southern El Niño oscillation in the formation of surface baric fields of the Southern and Northern Hemispheres** [Rol' iuzhnogo kolebaniia El'-Nin'o v formirovanii prizemnykh baricheskikh poleĭ iuzhnogo i severnogo polushariĭ], Vsesoiuznyĭ simpozium "Meteorologicheskie issledovaniia v Antarktike," 3rd, Leningrad, Oct. 22-24, 1986. Sbornik dokladov (All-Union Symposium "Meteorological investigations in the Antarctic", 3rd, Leningrad, Oct. 22-24, 1986. Proceedings). Vol.1, Leningrad, Gidrometeoizdat, 1990, p.158-160, In Russian. 5 refs.

A link is found between the southern oscillation index and the first coefficients of a breakdown by natural orthogonal components of the pressure anomaly in both hemispheres. It is proposed that the established link be used in long-range weather forecasting in Antarctica.

I-45670

Rabtsevich, S.V., Ryzhakov, L.IU., **Autumn weather conditions in East Antarctica and their long range forecasting** [Pogodnye usloviia osenyiu v Vostochnoĭ Antarktide i ikh dolgosrochnyĭ prognoz], Vsesoiuznyĭ simpozium "Meteorologicheskie issledovaniia v Antarktike," 3rd, Leningrad, Oct. 22-24, 1986. Sbornik dokladov (All-Union Symposium "Meteorological investigations in the Antarctic", 3rd, Leningrad, Oct. 22-24, 1986. Proceedings). Vol.1, Leningrad, Gidrometeoizdat, 1990, p.161-164, In Russian. 3 refs.

A working hypothesis is presented based on the principles of the macrocirculation method of long-range meteorological forecasting. In the compiled 1979 autumn prognostics in East Antarctica, predicted frequency anomalies show in the mean monthly values of various forms of atmospheric circulation, pressure and temperature.

I-45671

Sokolov, S.T., **Synoptic setting of unfavorable meteorological conditions for flights over East Antarctica during the warm season** [Sinopticheskaia obstanovka neblagopriiatnykh meteorologicheskikh usloviĭ pri poletakh nad Vostochnoĭ Antarktidoĭ v teploe vremia goda], Vsesoiuznyĭ simpozium "Meteorologicheskie issledovaniia v Antarktike," 3rd, Leningrad, Oct. 22-24, 1986. Sbornik dokladov (All-Union Symposium "Meteorological investigations in the Antarctic", 3rd, Leningrad, Oct. 22-24, 1986. Proceedings). Vol.1, Leningrad, Gidrometeoizdat, 1990, p.164-167, In Russian. 7 refs.

Prolonged unfavorable weather conditions, preventing air navigation between Mirnyy and Vostok, and Mirnyy and Molodezhnaya Stations during the summer seasons of 1975-1976 and 1976-1977, are described. Activation of frontal sections over antarctic coasts—the eastern frontal waves—are studied and the cyclonic trajectories are illustrated. Some suggestions for safer air navigation are made.

I-45672

Riabkov, G.E., Bozhkov, A.T., **Properties of atmospheric processes over the south polar region and their influence on ice conditions in the antarctic seas in 1983-1985** [Osobennosti atmosfernykh protsessov nad iuzhnoĭ poliarnoĭ oblast'iu i ikh vlianie na ledovye usloviia antarkticheskikh moreĭ v 1983-1985 gg.], Vsesoiuznyĭ simpozium "Meteorologicheskie issledovaniia v Antarktike," 3rd, Leningrad, Oct. 22-24, 1986. Sbornik dokladov (All-Union Symposium "Meteorological investigations in the Antarctic", 3rd, Leningrad, Oct. 22-24, 1986. Proceedings). Vol.1, Leningrad, Gidrometeoizdat, 1990, p.168-171, In Russian. 4 refs.

The relationship between atmospheric processes and sea ice conditions in 1983-1985 is discussed. The dominant role of atmospheric circulation in the deviation of ice processes from long-term average conditions is established. The role of thermal and dynamic factors in the inertia of ice phenomena is evaluated.

I-45673

Lutsenko, E.I., **Link between atmospheric and ice processes and navigation in the Pacific sector of the Antarctic in 1985-1986** [O sviazi atmosfernykh i ledovykh protsessov v tikhookeanskom sektore Antarktiki v navigatsiiu 1985/86 g.], Vsesoiuznyĭ simpozium "Meteorologicheskie issledovaniia v Antarktike," 3rd, Leningrad, Oct. 22-24, 1986. Sbornik dokladov (All-Union Symposium "Meteorological investigations in the Antarctic", 3rd, Leningrad, Oct. 22-24, 1986. Proceedings). Vol.1, Leningrad, Gidrometeoizdat, 1990, p.171-174, In Russian. 6 refs.

Synoptic and satellite data obtained during the POLEX- South-86 expedition, on atmospheric processes and sea ice distribution over the western portion of the South Pacific Ocean, are analyzed. A cause-effect relationship is found between atmospheric anomalies observed in Feb. 1986 and those observed in sea ice distribution. The nature of the main area of cyclogenesis in the investigated region is considered.

I-45674

Zhdanov, L.A., **"Robot-synoptic"** ["Robot-sinoptik"], Vsesoiuznyĭ simpozium "Meteorologicheskie issledovaniia v Antarktike," 3rd, Leningrad, Oct. 22-24, 1986. Sbornik dokladov (All-Union Symposium "Meteorological investigations in the Antarctic", 3rd, Leningrad, Oct. 22-24, 1986. Proceedings). Vol.1, Leningrad, Gidrometeoizdat, 1990, p.174-177, In Russian. 2 refs.

"Robot-synoptic", an automated synoptic and statistical method for compiling diurnal short-term weather forecasts, is described. Regional investigations of typical antarctic synoptic processes were carried out in Jan. and Feb. 1982, yielding 15 short-term weather forecasts based on experimentation with the method described. Results of the experiments are discussed; the positive aspects and advantages of the method are stressed.

I-45675

Zabolotskiĭ, F.D., **Air turbulence in the antarctic surface boundary layer and prognosis of geodetic refraction** [Turbulentnost' vozdukha v prizemnom sloe Antarktidy i prognoz geodezicheskoĭ refraktsii], Vsesoiuznyĭ simpozium "Meteorologicheskie issledovaniia v Antarktike," 3rd, Leningrad, Oct. 22-24, 1986. Sbornik dokladov (All-Union Symposium "Meteorological investigations in the Antarctic", 3rd, Leningrad, Oct. 22-24, 1986. Proceedings). Vol.1, Leningrad, Gidrometeoizdat, 1990, p.177-181, In Russian. 8 refs.

An analysis is carried out of the vertical distribution of atmospheric temperature and wind speed based on hourly meteorological measurements, at 0.5, 1, 2, 4, 8, 16, and 30 m, made at Mizuho Station from Jan. to May, 1981. The thermodynamics of the surface boundary layer are evaluated. From temperature gradient measurements, the angles and coefficients of vertical refraction for a range of 10 km are calculated. The effects of the refraction on the accuracy of trigonometric leveling are discussed.

I-45676
Tarasenko, D.A., **Empirical models of thermodynamic parameters of the Southern Hemisphere mesosphere** [Empiricheskie modeli termodinamicheskikh parametrov mezosfery iuzhnogo polushariia], Vsesoiuznyĭ simpozium "Meteorologicheskie issledovaniia v Antarktike," 3rd, Leningrad, Oct. 22-24, 1986. Sbornik dokladov (All-Union Symposium "Meteorological investigations in the Antarctic", 3rd, Leningrad, Oct. 22-24, 1986. Proceedings). Vol.1, Leningrad, Gidrometeoizdat, 1990, p.181-184, In Russian. 5 refs.

On the basis of the atmospheric model of the Middle Atmosphere Program, the characteristics of kinetic energy are studied and their interhemispheric differences are analyzed. Data on interannual and mean monthly variations of the thermal regime and circulation during winter, depending on features of the middle atmosphere wave structure, are presented.

I-45677
Kidiiarova, V.G., Shcherba, I.IA., **Interannual variation of large-scale thermobaric systems and dynamics of planetary waves in the extratropical southern troposphere** [Mezhgodovaia izmenchivost' krupnomasshtabnykh termobaricheskikh sistem is dinamika planetarnykh voln v troposfere vnetropicheskikh shirot iuzhnogo polushariia], Vsesoiuznyĭ simpozium "Meteorologicheskie issledovaniia v Antarktike," 3rd, Leningrad, Oct. 22-24, 1986. Sbornik dokladov (All-Union Symposium "Meteorological investigations in the Antarctic", 3rd, Leningrad, Oct. 22-24, 1986. Proceedings). Vol.1, Leningrad, Gidrometeoizdat, 1990, p.184-187, In Russian. 3 refs.

An analysis is carried out of planetary wave amplitudes in the geopotential field of the 500 gp isobaric surface layer, between latitudes 60 and 70S, obtained during July in 1970-1978. A connection is noted between the interannual variations of planetary wave amplitudes in phases of 2-year cyclic fluctuations of tropical circulation.

I-45678
Tarasenko, D.A., **Differences of large-scale processes in the stratosphere and mesosphere of Northern and Southern Hemispheres** [Razlichiia krupnomasshtabnikh protsessov v stratosfere i mezosfere severnogo i iuzhnogo polushariĭ], Vsesoiuznyĭ simpozium "Meteorologicheskie issledovaniia v Antarktike," 3rd, Leningrad, Oct. 22-24, 1986. Sbornik dokladov (All-Union Symposium "Meteorological investigations in the Antarctic", 3rd, Leningrad, Oct. 22-24, 1986. Proceedings). Vol.1, Leningrad, Gidrometeoizdat, 1990, p.187-193, In Russian. 11 refs.

Data on interhemispheric differences in temperature, geopotential height and wind, by latitude and time of year, are discussed. Temperature differences are found to relate to stratospheric height; in the mesosphere, the differences are insignificant. Comparison of baric topography maps from both hemisphere shows the following: a more intense summer circumpolar anticyclone in the southern mesosphere, and higher geopotential height in the center of the anticyclone than in the Northern Hemisphere; in the winter, the south polar cyclone is also more intense than in the Northern Hemisphere, both in the stratosphere and in the mesosphere, but the geopotential height in the center of the cyclone is lower in the southern mesosphere, the interhemispheric differences diminishing with height.

I-45679
Kidiiarova, V.G., Fomina, N.N., Shcherba, I.IA., **Development of large-scale stratospheric processes in both hemispheres related to changes of solar activity levels during the 20th and 21st solar activity cycles** [Razvitie krupnomasshtabnikh protsessov stratosfery severnogo i iuzhnogo polushariĭ v sviazi s izmeneniiami urovnia solnechnoĭ aktivnosti v 20-m i 21-m tsiklakh solnechnoĭ aktivnosti], Vsesoiuznyĭ simpozium "Meteorologicheskie issledovaniia v Antarktike," 3rd, Leningrad, Oct. 22-24, 1986. Sbornik dokladov (All-Union Symposium "Meteorological investigations in the Antarctic", 3rd, Leningrad, Oct. 22-24, 1986. Proceedings). Vol.1, Leningrad, Gidrometeoizdat, 1990, p.193-196, In Russian. 4 refs.

Mean annual values of wind speed and temperature at an altitude of 30 km, obtained during the winter months of 1970-1984 in both hemispheres, are presented in a table. Analysis of the reaction of the stratosphere during the 20th and 21st solar activity cycles, which reached maxima in 1980 and 1970, confirms the interdependence of stratospheric thermodynamic changes between cycles and changes in the processes of planetary wave propagation.

I-45680
Kidiiarova, V.G., Fomina, N.N., **Contribution of planetary wave energy to the thermodynamic regime of the troposphere, stratosphere and mesosphere over the Antarctic in winter** [O vklade energii planetarnykh voln v termodinamicheskiĭ rezhim troposfery, stratosfery i mezosfery nad Antarktikoĭ v zimnie sezony], Vsesoiuznyĭ simpozium "Meteorologicheskie issledovaniia v Antarktike," 3rd, Leningrad, Oct. 22-24, 1986. Sbornik dokladov (All-Union Symposium "Meteorological investigations in the Antarctic", 3rd, Leningrad, Oct. 22-24, 1986. Proceedings). Vol.1, Leningrad, Gidrometeoizdat, 1990, p.196-199, In Russian. 5 refs.

Analysis of rocket sounding data over Molodezhnaya Station in July 1982 and 1984 shows a link between atmospheric temperature changes and the conditions of planetary wave propagation. For quantitative evaluation of the contribution of planetary wave energy to the thermodynamic regime of the investigated atmospheric regions, the coefficients of planetary wave refraction and flow in the tropopause and stratopause were used.

I-45681
Bugaeva, I.V., Butko, A.I., Riazanova, L.A., **Stratomesospheric processes over the Southern Hemisphere in winter 1985** [Stratosferno-mezosfernye protsessy nad iuzhnym polushariem zimoĭ 1985 g.], Vsesoiuznyĭ simpozium "Meteorologicheskie issledovaniia v Antarktike," 3rd, Leningrad, Oct. 22-24, 1986. Sbornik dokladov (All-Union Symposium "Meteorological investigations in the Antarctic", 3rd, Leningrad, Oct. 22-24, 1986. Proceedings). Vol.1, Leningrad, Gidrometeoizdat, 1990, p.199-203, In Russian. 2 refs.

Analysis of rocket and radar sounding data at Molodezhnaya Station in the winter of 1985 showed features of anomalous stratospheric and mesospheric warmings of the Southern Hemisphere, caused by meteorological changes. The heating formation is originally found at the mesospheric levels, sinking subsequently into the stratosphere. In the case under discussion, heat penetration into the underlying layer did not occur. The maximum heating was measured in the 35-45 km layer, amounting to more than 40 C.

I-45682

Koga, S., **Methanesulfonic acid and non-sea-salt sulfate over both hemispheric oceans,** *Meteorological Society of Japan. Journal,* Jan. 1991 69(1), p.1-13, 48 refs.

Aerosol particles were collected using an Andersen high-volume air sampler between Nov. 15, 1986 and Mar. 13, 1987 on board the icebreaker *Shirase* over the Indian and antarctic oceans. Data sampling was also done during the cruise of the *Hakuho Maru* from June 3 to Aug. 1, 1986 over the northern Pacific Ocean. The collected samples were analyzed by ion-chromatography to examine the mass concentrations of methanesulfonic acid and non-sea-salt sulfate within the aerosols. The results demonstrate that at higher latitudes, low air temperatures accelerate methanesulfonic acid (MSA) production while the lower concentration of oxidants, such as H2O2 and OH, retards non-sea-salt sulfate production from MSA and SO2. Also, strong wind contributes to the increase of the flux of dimethylsulfide from the ocean to the atmosphere. (Auth. mod.)

I-45687

Prather, M.J., **More rapid polar ozone depletion through the reaction of HOCl with HCl on polar stratospheric clouds,** *Nature,* Feb. 6, 1992 355(6360), p.534-537, 44 refs.

The direct reaction of HOCl with HCl, known to occur in liquid water and on glass surfaces, has now been measured on surfaces similar to polar stratospheric clouds and is shown here to play a critical part in polar ozone loss. Two keys to understanding the chemistry of the antarctic ozone hole are, (1), the recognition that reactions on polar stratospheric clouds transform HCl into more reactive species denoted by ClOx and, (2), the discovery of the ClO-dimer (Cl2O2) mechanisms that rapidly catalyses destruction of O3. Observations of high levels of OClO and ClO in the springtime antarctic stratosphere confirm that most of the available chlorine is in the form of ClOx. But current photochemical models have difficulty converting HCl to ClOx rapidly enough in early spring to account fully for the observations. It is shown using a chemical model, that the direct reaction of HOCl with HCl provides the missing mechanism. As alternative sources of nitrogen-containing oxidants, such as N2O5 and ClONO2, have been converted in the late autumn to inactive HNO3 by known reactions on the sulphate-layer aerosols, the reaction of HOCl with HCl on polar stratospheric clouds becomes the most important pathway for releasing that stratospheric chlorine which goes into polar night as HCl. (Auth).

I-45689

Johnson, C., Henshaw, J., McInnes, G., **Impact of aircraft and surface emissions of nitrogen oxides on tropospheric ozone and global warming,** *Nature,* Jan. 2, 1992 355(6355), p.69-71, 26 refs.

Actual and potential increases in aircraft traffic are causing concern about the effects of aircraft exhaust emission on atmospheric chemistry. Model results and measurements in the Northern Hemisphere have shown that growth in surface emissions of nitrogen oxides and hydrocarbons leads to increases in concentration of tropospheric ozone. The radiative forcing of surface temperature is most sensitive to changes in tropospheric ozone at a height of about 12 km, where aircraft emissions of nitrogen oxides are at a maximum and where the model sensitivity of ozone to nitrogen oxide emissions is enhanced. The model results show that the radiative forcing of surface temperature is about thirty times more sensitive to aircraft emissions of nitrogen oxides than to surface emissions. It also appears that the impact on global warming of increases in tropospheric ozone caused by increases in surface emissions of nitrogen oxides has previously been overestimated by a factor of five owing to an error in the calculation of the ozone budget. A modelled graph of changes in mixing ratio distribution of tropospheric ozone caused by aircraft emissions compares northern and southern polar regions. (Auth. mod.)

I-45691

Chesters, D., Krueger, A.J., **Video atlas of TOMS ozone data, 1978-88,** *American Meteorological Society. Bulletin,* Dec. 1989 70(12), p.1564-1569, 14 refs.

The Total Ozone Mapping Spectrometer (TOMS), on board NASA's Nimbus-7 weather satellite, has been observing ozone over the earth once daily for the last 10 yr. A time-lapse atlas of 3440 color-coded images drawn from the TOMS archive from 1978 to 1988 has been visualized on a standard VHS videotape that is now available from NASA. The rapid and complex ozone variations presented demonstrate the difficulty of separating man-induced climate changes from natural variability. This article presents a few images from the atlas and describes interesting features in the animation, such as the correlation between ozone and "the weather," and the recent deepening of the annual ozone hole over the South Pole. Originally intended as a browsing tool for the TOMS digital database, the videotape is a vivid presentation of the earth's atmospheric dynamics and chemistry, and is recommended for scientists, educators, policy makers, and citizens concerned about the global environment.

I-45717

Zhadin, E.A., **Planetary waves and interannual ozone anomalies in polar regions,** *Akademiia nauk SSSR. Izvestiya. Atmospheric and oceanic physics,* Nov. 1990(Pub. June 91) 26(11), p.847-850, 22 refs. Translated from Akademiia nauk SSSR. Izvestiia. Fizika atmosfery i okeana.

The problem of ozone anomalies in the polar regions of the northern and southern hemispheres is discussed. Hypotheses are advanced to explain the ozone "hole" in Antarctica and the interannual ozone trends in the polar regions of the northern hemisphere. Data supporting a wave hypothesis of the origin of ozone anomalies and related variations in anticipated long-period variations in sea temperature are offered. Calculations of the effect of sea temperature anomalies on jetstream ozone transfer in a linear model of stationary planetary waves have demonstrated that anomalous variations in the ozone layer may be related to geographical variations of thermal streams (the Gulf Stream and Kuroshio and the El Niño phenomenon). (Auth.mod.)

I-45740

Chandra, S., Stolarski, R.S., **Recent trends in stratospheric total ozone: implications of dynamical and El Chichon perturbations,** *Geophysical research letters,* Dec. 1991 18(12), p.2277-2280, 22 refs.

The recently reprocessed Nimbus-7 TOMS total ozone data from 1979 to 1989 are analyzed to assess the global impact of the El Chichon volcanic eruption on stratospheric total ozone. An apparent decrease in total ozone of 5 to 6% occurred during the winter of 1982-83 following the eruption of El Chichon. A regression analysis of total ozone with the equatorial zonal wind at 30 mb indicates that response to the quasi-biennial oscillation can explain much of the observed ozone anomaly, and that the total ozone decrease which can be attributed to El Chichon is at most 2 to 4%. This study also suggests that the interannual variability caused by the quasi-biennial oscillation and planetary wave activity may introduce apparent seasonal trends in total ozone and temperature in the lower stratosphere, particularly if the data record is not very long. Such trends may affect the assessment of total ozone changes caused by chemical perturbations. The data range for this trend analysis extends from 60N through 60S. (Auth.)

I-45743

Gushchin, G.P., **Dynamic mechanism and chemistry of spring ozone depletion in the antarctic atmosphere** [Dinamichesko-khimicheskiĭ mekhanizm vesennego umen'sheniia ozona v antarkticheskoĭ atmosfere], *Leningrad. Glavnaia geofizicheskaia observatoriia. Trudy,* 1991 Vol.533, p.30-55, In Russian. 34 refs.

The author discusses monthly averages of total ozone values measured in Sep. and Oct. of 1976-1987 at Mirnyy Station; seasonal variations of monthly averages of total ozone at the South Pole during 1964-1979 and 1980-1985; total ozone at the South Pole in 1986 and 1987; vertical ozone distribution at the South Pole during Aug.-Dec. 1987; and ozone interaction with other stratospheric components. Graphs and tables are included.

I-45748

McCormick, M.P., Veiga, R.E., Chu, W.P., **Stratospheric ozone profile and total ozone trends derived from the SAGE I and SAGE II data,** *Geophysical research letters,* Feb. 7, 1992 19(3), p.269-272, 5 refs.

SAGE I/II ozone data from 1979-1991 have been used to derive global trends in both stratospheric column ozone and as a function of altitude. A statistical model containing quasibiennial, seasonal, and semiannual oscillations, a linear component, and a first-order autoregressive noise process was fit to the time series of SAGE I/II monthly zonal mean data. The linear trend in column ozone above 17 km altitude, averaged between 65S and 65N, is -0.30%/year or -3.6% over the time period Feb. 1979 through Apr. 1991. The data further show that the column trend above 17 km is nearly zero in the tropics and increases towards the high latitudes with values of -0.6%/year at 60S and -0.35%/year at 60N. Both these results are in agreement with the recent TOMS results. Furthermore, the profile trend analyses show that column ozone losses are occurring below 25 km, with most of the loss coming from the region between 17 and 20 km. Negative trend values on the order of -2%/year are found at 17 km in mid-latitudes. (Auth.)

I-45749

Murphey, B.B., Hogan, A.W., **Meteorological transport of continental soot to Antarctica,** *Geophysical research letters,* MP 3025, Jan. 3, 1992 19(1), p.33-36, 23 refs.

An impactor/concentrator/microdensitometer (ICM) instrument system has been constructed and calibrated. This system is sufficiently sensitive to measure the black (carbon soot) component of antarctic aerosol with a sampling time of four hours. The impactor concentrator was exposed to antarctic air at Ross I. in Sep. 1987. Microdensitometer analysis of the collected specimens indicates that the maximum black aerosol concentration was observed concurrently with the arrival of the warmest air accompanying a cyclonic storm. This is similar to the concurrence of continental radon and lead isotopes with warm advection, measured on the antarctic coast in 1986. It is possible that continental soot can be transported to the antarctic coast several times each year by this mechanism. (Auth.)

I-45750

Madronich, S., **Implications of recent total atmospheric ozone measurements for biologically active ultraviolet radiation reaching the earth's surface,** *Geophysical research letters,* Jan. 3, 1992 19(1), p.37-40, 24 refs.

Recent satellite measurements of total atmospheric ozone were analyzed to deduce the changes in biologically active ultraviolet (UV) radiation reaching the Earth's surface from 1979 to 1989. The calculated increases are on average substantially larger than earlier estimates, particularly at mid- and high latitudes of both hemispheres. Charts show trends in daily global effective UV radiation dose for DNA damage from 85S to 85N, and a table shows ozone trends for RB meter, erythema induction, plant damage, and DNA damage over the same range of latitudes. (Auth. mod.)

I-45751

Hernandez, G., Smith, R.W., Conner, J.F., **Neutral wind and temperature in the upper mesosphere above the South Pole, Antarctica,** *Geophysical research letters,* Jan. 3, 1992 19(1), p.53-56, 28 refs.

The neutral wind and temperature of the upper mesosphere above Amundsen-Scott Station have been optically determined from the emission of naturally-occurring OH tracer molecular species. The results show that quasi-periodic oscillations occur on these fields at near semi-diurnal frequencies. In addition, the steady component of the winds indicates that the center of the polar vortex, at mesospheric heights, is displaced from the geographic pole. Examination of the data suggests that the observed oscillations are caused by the transport of lower-latitude tidal oscillations by ducting processes. (Auth.)

I-45753

Collins, R.L., Senft, D.C., Gardner, C.S., **Observation of a 12 h wave in the mesopause region at the South Pole,** *Geophysical research letters,* Jan. 3, 1992 19(1), p.57-60, 12 refs.

In Dec. 1989 a Na lidar was installed at the Amundsen-Scott Station and was used to measure aerosol, stratospheric temperature and mesospheric Na profiles through Oct. 1990. The mesospheric Na data are used to characterize the gravity wave field in the mesopause region. These first lidar observations of Na layer dynamics at the South Pole show strong wave activity during the antarctic winter. Data for June 25 and Aug. 19, 1990 UT are presented here. The total wave-induced variances in atmospheric density are respectively 29 and 35 (%). The Na layer centroid height is very low during both observation periods. On June 25 a strong 12 h oscillation was observed in the bottomside of the Na layer which extends to altitudes as low as 74 km. The vertical displacement and temperature amplitudes associated with the 12 h wave are similar to the pseudotide observed at Svalbard in 1986. (Auth.)

I-45807

Winkler, P., Brylka, S., Wagenbach, D., **Regular fluctuations of surface ozone at Georg-von- Neumayer Station, Antarctica,** *Tellus,* Feb. 1992 44B(1), p.33-40, 22 refs.

In this paper, it is shown that surface ozone at the Georg von Neumayer (GvN) Station in Antarctica exhibits long frequency fluctuations with periods of 30, 18, and 14 days. In some years, these periods are also visible in the temperature. Periods of 25-30 days have been established for antarctic radon- 222 in the literature in several investigations; however, radon- 222 measurements at GvN do not show the 30-day period which may be suppressed there by the meteorological situation. A hypothesis is proposed to explain how the periodic fluctuations of ozone and of radon-222 at GvN and other sites could be caused by long-range transport phenomena. The mechanism which induces the periodic fluctuations remains unknown. (Auth. mod.)

I-45808

Simmonds, I., Budd, W.F., **Sensitivity of the Southern Hemisphere circulation to leads in the antarctic pack ice,** *Royal Meteorological Society. Quarterly journal,* July 1991 117(501)Pt.B, p.1003-1024, 33 refs.

Four experiments were conducted to assess the sensitivity of the Southern Hemisphere circulation to changes in the fraction of open water in the sea ice, using a July 21-wave General Circulation Model (GCM) with this fraction set to 5, 50, 80 and 100%. The mean surface temperatures and the surface atmospheric temperatures over the sea ice increased as the water fraction increased and the largest changes were simulated adjacent to the coast. Significant anomalies in the surface heat fluxes, particularly those of sensible heat, accompanied the decrease in the sea ice concentration. Substantial atmospheric warming was simulated over and in the vicinity of areas in which leads were considered. In all but one experiment there were anomalous easterlies between about 40 and 60S with westerly anomalies further to the south. The surface pressure at high latitudes appears to change in a consistent fashion with the fraction of open water, with the largest changes occurring in the Weddell and near the Ross Seas. Some of the feedbacks which may enhance the responses here, but which are not included in this model, are discussed. (Auth. mod.)

I-45809

Singh, R., Pasricha, P.K., Sharma, M.C., Srivastava, B.N., **Multi wavelength measurements of atmospheric turbidity and determination of the fluctuations in total ozone over Antarctica,** *Atmospheric environment,* Mar. 1992 26A(4), p.525-530, 7 refs.

Sun photometer measurements have been made at various wavelengths during a number of Indian expeditions to Antarctica. Measurements have also been made over the ocean on a cruise to one of the expeditions. Both the optical depth (a(H)) and the turbidity (T) due to atmospheric haze aerosols have been computed over the ocean and over Antarctica. In general, the values of the optical depth are higher at lambda=368 nm than at lambda=500 nm. The values of the optical depth (and turbidity) are also higher over the ocean than over Antarctica. Based on the measurements made at lambda=368 and 500 nm, the exponent alpha=2 describes the wavelength dependence of the optical depth. This wavelength dependence of the optical depth has been used to obtain the optical depth at lambda=310 nm. The corresponding value of the selective absorption due to ozone is much greater than the aerosol optical depth a(H). The relative variability in the measured intensity at lambda=310 nm, at a zenith angle of 60 deg, during this period is observed to be about 14%. The relative variability in the total ozone obtained from *in situ* measurements with the Total Ozone Mapping Spectrometer (TOMS) for the same period is about 3%. It is shown that the wavelength lambda=310 nm, which is towards the upper limits of the UV-B band that is highly absorbed, is perhaps best suited to monitor fluctuations in the total ozone. This technique is likely to be more effective during the local spring period of Sep.-Nov. over Antarctica, where the phenomenon of the ozone hole occurs. (Auth. mod.)

I-45810

Sharma, M.C., Srivastava, B.N., **Ultraviolet radiation received in Antarctica in comparison with the Indian region,** *Atmospheric environment,* Mar. 1992 26A(4), p.731-734, 13 refs.

The decrease in atmospheric ozone over Antarctica during Sep.-Oct. 1987 implies enhanced UV radiation received at the ground in the region of the ozone hole. At the ozone hole in Antarctica the decrease in total ozone is enormous, and sometimes the level is reduced to 120-130 DU, whereas the normal value of total ozone is around 300 DU. The decrease in ozone will not only increase UV-B radiation several-fold but will also shift the cut-off wavelength to lower wavelengths. A model calculation for UV-B radiation reaching ground level for different total ozone content (100-340 DU) has been carried out for several solar zenith angles appropriate to Indian as well as antarctic stations. The UV-B radiation received at Antarctica during the ozone-hole period are comparable to that received at equatorial stations over the summer period. (Auth. mod.)

I-45811

Hamill, P., Toon, O.B., **Polar stratospheric clouds and the ozone hole,** *Physics today,* Dec. 1991 49(12), p.34-42, 22 refs.

Clouds of frozen nitric acid particles that form in the polar winter stratosphere are a crucial element in the massive springtime ozone depletion over Antarctica. This paper describes the mechanisms which govern the formation of such clouds, analyzes the chemical processes which appear to account for ozone depletion, and details meteorological variables which are implicated in the attenuation of atmospheric gases. (Auth. mod.)

I-45814

Keller, L.M., Weidner, G.A., Stearns, C.R., **Antarctic automatic weather station data for the calendar year 1990,** Madison, University of Wisconsin, Dec. 1991, 383p.

A network of automatic weather station (AWS) units is deployed to collect antarctic surface weather observations in support of meteorological research projects and operational activities. The 1990 network consisted of 31 AWS units from the Antarctic Peninsula to the Adélie Coast. The site name, coordinates, and elevation are included for each unit. Each unit measures the air temperature, wind speed, and wind direction at a height of 3 m and air pressure at a height of 1.5 m. Some of the units also measure the relative humidity at 3 m and the vertical air temperature difference between 0.5 and 3 m. Monthly and three-hourly data summaries are provided for each AWS unit.

I-45843

Aikin, A.C., **Spring polar ozone behavior,** *Planetary and space science,* Jan. 1992 40(1), p.7-26, Refs. p.24-26.

It has been recognized since the commencement of antarctic ozone measurements during the IGY that spring southern polar total ozone amount is less than spring northern polar total ozone amount. More importantly, since 1980 there has been a decline in the minimum spring total ozone value, from 250 DU in 1980 to 125 DU in 1987 and below 120 in 1991. This decline occurs within the winter polar vortex, which acts as a containment vessel preventing polar ozone from escaping to lower latitudes and excluding ozone-rich air from the polar region. Ozone decrease can be explained in terms of heterogeneous reactions of chlorine and nitrogen reservoir molecules on polar stratospheric clouds. These clouds form in the lower polar stratosphere during winter when temperatures in the Antarctic are sufficiently low to create water ice clouds. Clouds involving nitric acid form at higher temperatures. Chlorine reservoirs such as HCl are converted to Cl2, which is photodissociated in the presence of sunlight. The resulting Cl reacts with O3 to form ClO. Measurements of ClO and other species give agreement of theory and experiment within the uncertainties of the measurement. Heterogeneous chemistry accounts for most of the ozone hole. There is much less ozone depletion in the Arctic. This is the result of a less stable polar vortex and warmer temperatures, which reduce polar stratospheric cloud formation. (Auth. mod.)

I-45860

Glowienka-Hense, R., Hense, A., Völker, C., **ECMWF versus Hellermann & Rosenstein stress climatology of the southern ocean,** *Antarctic science,* Mar. 1992 4(l), p.111-117, 12 refs.

A time series of wind stresses computed from European Centre for Medium Range Weather Forecast (ECMWF) wind data is compared to the climatology of Hellermann & Rosenstein (HR) for the Southern Hemisphere. ECMWF stresses are generally stronger, especially in the westerly belt. However, they have an overall lower meridional component than the HR data. The dominance of the half annual cycle relative to the annual wave in the zonal stress at middle to high latitudes, which is documented for independent data sets, is seen in the ECMWF but not in the HR data. ECMWF winds are also compared with measurements from three expeditions to the Weddell Sea by RV *Polarstern.* (Auth. mod.)

I-45866

Crowley, T.J., Baum, S.K., **Toward reconciliation of Late Ordovician (approx. 440 Ma) glaciation with very high CO2 levels,** *Journal of geophysical research,* Dec. 20, 1991 96(D12), p.22,597-22,610, Refs. p.22,608-22,610.

Although Phanerozoic glaciations usually coincided with times of estimated low atmospheric CO2, the Late Ordovician (440 Ma) glaciation is a significant exception. CO2 levels during that time may have been as much as 10 times greater than at present. In an earlier paper it was suggested that the unique geographic configuration of Gondwanaland may explain such a response, as the edge of the supercontinent was essentially tangent to the south pole, and the moderating effect of the nearby ocean may have suppressed the magnitude of summer warming on the landmass, thereby allowing glacial inception. One limitation to the earlier study was that it used a linear energy balance model (EBM). In this paper the above hypothesis is examined in a suite of experiments with a nonlinear EBM that allows for snow-albedo feedback. Also utilized were updated estimates for CO2 levels, decreased in solar luminosity, and variations in orbital forcing. Results obtained provide additional support for the high CO2/glaciation explanation, with the caveat that even the partial success occurs only when parameters are at the extreme end of their permissible range. The estimated duration of Ordovician glaciation is also consistent with the migration of Gondwanaland across the south pole, with a centrally located pole yielding ice-free conditions in the summer. Thus identical levels of external forcing yield either glaciated or ice-free conditions, with the solution dependent on location of the landmass. Although more work is required on this topic, these experiments suggest that there may be a relatively parsimonious explanation for this perplexing paleoclimatic paradox. The results lend further support to the proposition that paleogeography significantly modifies the role of CO2 in the long-term evolution of climate. (Auth. mod.)

I-45875

Giovinetto, M.B., Bromwich, D.H., Wendler, G., **Atmospheric net transport of water vapor and latent heat across 70S,** *Journal of geophysical research,* Jan. 20, 1992 97(D1), p.917-930, Refs. p.928-930.

The annual net atmospheric transports of water vapor and latent heat poleward across 70S are estimated using the latest compilation of surface mass balance for the antarctic ice sheet and new estimates of precipitation and evaporation in sectors of the southern oceans and of seaward drifting snow transport in particular sectors of the ice sheet. The mass and energy exchange rates at the ice sheet-atmosphere and ocean- atmosphere interfaces are integrated strictly for areas within that latitude. The estimates of net southward water vapor transport (6.6 kg/m/s) and latent transport (18.9 MJ/m/s) are larger than reported in all preceding studies, based on atmospheric advection and moisture data collected at stations located between 66S and 80S, and are generally in agreement with those based on surface mass balance data and seaward drifting snow transport across the ice terminus which extends between 65S and 79S. (Auth.)

I-45876

Beaglehole, D., Carter, G.G., **Antarctic skies. 1. Diurnal variations of the sky irradiance, and UV effects of the ozone hole, spring 1990,** *Journal of geophysical research,* Feb. 20, 1992 97(D2), p.2589-2596, 12 refs.

This is the first of two papers reporting measurements made near Scott Base during the spring of 1990. It describes the hourly and daily variations of the light falling on a horizontal surface, with the incident light divided into two components, that from the sun directly and that from the sky. The light has been separated into four wavelength bands covering the blue to the UVB region of the spectrum. The intensities have been compared with values measured in Wellington, New Zealand. A simple air mass dependence has been found which fits the complete data set once a surface albedo parameter is taken into account, which provides an easy estimate for the daily average illumination throughout the year. The paper also correlates the changes in the UV and UVB with changes in upper atmosphere ozone concentration, and compares the total daily UV dose in the Antarctic with that at Wellington, a typical mid-latitude site. (Auth.)

I-45877

Beaglehole, D., Carter, G.G., **Antarctic skies. 2. Characterization of the intensity and polarization of skylight in a high albedo environment,** *Journal of geophysical research,* Feb. 20, 1992 97(D2), p.2597-2600, 10 refs.

Work in the Antarctic during spring 1990 has been aimed at obtaining a full understanding of the properties of light falling onto this continent. The present paper describes details of the intensity and polarization distribution of the indirect skylight in the sun-zenith plane measured near McMurdo, and these are also compared with measurements made at Wellington, New Zealand. The light in Antarctica is shown to have a low maximum polarization of about 40%, essentially independent of wavelength across the visible spectrum. The intensity is strongest for light coming from directions in opposition to the sun. A simple model shows that these features are due to multiple scattering in the atmosphere induced by the high snow albedo. A comparison is made with functions derived from theory. (Auth.)

I-45881

Pasricha, P.K., **Characteristics of atmospheric turbulence in the surface layer over Antarctica,** *Boundary-layer meteorology,* Nov. 1991 57(3), p.207-217, 10 refs.

This paper presents meteorological measurements made during the summer period, on two 9 m and 3 m towers of the stations Maitri and Dakshin Gangotri, respectively. The measurements of fluctuations in temperature and wind speed made with relatively lesser precision instrumentation pertain to smaller wave numbers about 0.01/m appropriate to outer scale *L*o of the atmospheric turbulence spectrum. Autocorrelation analysis of the fluctuations in temperature and wind speed has been performed. A new autoregressive scheme has been developed to represent the computed autocorrelation functions by a Yule statistical model, and to estimate the correlation period *T*o of the turbulent medium. The similarity theory of Monin-Obukhov has been used to compute height profiles of temperature structure parameter *C*2T. At Maitri, values of *L*o and *C*2T are higher between 03-22 h local time than between 22-03 h. Values of *L*o and *C*2T are smaller over the ice shelf terrain of Dakshin Gangotri Station, compared to those over the rocky terrain of Maitri Station. (Auth. mod.)

I-45899

Van Loon, H., **Review of the surface climate of the Southern Hemisphere and some comparisons with the Northern Hemisphere,** *Journal of marine systems,* July 1991 2(1-2), p.171-194, 14 refs.

This review points out features in the annual curves of some climate elements on the Southern Hemisphere which differ from their counterpart on the Northern Hemisphere. Among the topics are the effect on the surface air temperature of the different proportions of land and water at corresponding latitudes, including the decreasing annual temperature range with increasing latitude in the temperate regions of the Southern Hemisphere which is found only in limited open-ocean areas on the Northern Hemisphere. The change of sea level mean pressure in middle and high south latitudes through the year is dominated by a semi-annual wave which changes phase near 60 S from equinoctial maxima in the north to solstitial maxima in the south. A dominant semi-annual wave in the wind and the Antarctic Circumpolar Current is associated with the pressure wave. In the Northern Hemisphere the large land masses in middle and high latitudes impose an overwhelming mean annual wave on the circulation, although locally there are appreciable semi-annual components. (Auth.)

I-45927

Brenninkmeijer, C.A.M., **Interhemispheric asymmetry in OH abundance inferred from measurements of atmospheric C-14O,** *Nature,* Mar. 5, 1992 356(6364), p.50-52, 35 refs.

The hydroxyl radical, OH, is the chief oxidizing agent in the atmosphere, and is responsible for removing many natural and anthropogenic trace gases. At present, OH cannot be measured directly with sufficient accuracy over the spatial and temporal scales needed for global models of atmospheric chemistry. Consequently, estimates of atmospheric OH abundance rely on a combination of models incorporating OH chemistry and observations of trace gases sensitive to OH. C-14O is an important diagnostic of OH abundance. Using accelerator mass spectrometry, an extensive set of C-14O data in New Zealand and several new Northern Hemisphere results are presented. Southern Hemisphere C-14O concentrations are 40% lower than at comparable latitudes in the Northern Hemisphere. Such a large difference is surprising, because the dominant sources and sinks are believed to be similar in both hemispheres. Although there are several complicating factors, the results suggest that OH abundances may be significantly higher in the Southern Hemisphere than in the Northern Hemisphere, in contrast to predictions using current photochemical models. (Auth. mod.)

I-45932

Sowers, T., **Delta O-18 of atmospheric O2 from air inclusions in the Vostok ice core: timing of CO2 and ice volume changes during the penultimate deglaciation,** *Paleoceanography,* Dec. 1991 6(6), p.679-696, Refs. p.694-696.

A record of atmospheric CO2 variations over the last 160,000 years has recently been constructed by analyzing the trapped gas in the Vostok ice core. The relationship between changes in atmospheric CO2 and the size of the continental ice sheets has been difficult to ascertain, because the CO2 record is obtained from ice cores while the ice volume record has been constructed from the stable isotopic composition of biogenic CaCO3 in deep-sea sediment cores. In order to compare these two records in a more precise manner, a record is presented of the isotopic composition (delta O-18) of atmospheric O2 trapped in the Vostok ice core, and it is proposed that it may be considered a proxy for the delta O-18 of seawater and hence ice volume. Having a record of atmospheric CO2 along with a continental ice volume proxy in trapped air in the same ice core allows one to compare the timing of changes in these two parameters with little uncertainty in the relative ages of important events. Results suggest that during the penultimate glacial termination, atmospheric CO2 began to increase at least 3 kyr before the initial introduction of meltwater to the oceans. (Auth. mod.)

I-45980

International Conference on the Role of the Polar Regions in Global Change, Fairbanks, June 11-15, 1990, Weller, G., ed, Wilson, C.L., ed, Severin, B.A.B., ed, **Proceedings,** Fairbanks, University of Alaska, Dec. 1991, 778p. (2 vols.), ADA-253 027, ADA-253 028, Refs. passim. For selected papers see 46-3132 through 46-3181, 46-3194 through 46-3248, or A-45985, B-46032 through B-46034, E-46038, E-46040, E-46042, F-45981, F-45982, F-45984, F-45989, F-45994, F-45995, F-46035 through F-46037, F-46039, F-46041, I-45983, I-45986 through I-45988, I-45992, I-45993, I-46043 through I-46046, J-45990 and J-45991.

This is a 2-volume collection of abstracts and full length papers —30 of the latter being pertinent to Antarctica— presented at the International Conference on the Role of the Polar Regions in Global Change, held in Fairbanks, AK, on June 11-15, 1990. The reports are grouped into 7 sections according to the following areas of interest: detection and monitoring of change; climate variability and climate forcing; ocean-sea ice-atmosphere interactions and processes; effects on biota and biological feedbacks; ice sheet, glacier and permafrost responses and feedbacks; paleoenvironmental studies; and aerosols/-trace gases. A summary of recommendations of panel discussions, and photographs, addresses of primary authors, and an author index follow the final section of papers.

I-45983

Stearns, C.R., Weidner, G.A., **Polar automatic weather station project of the University of Wisconsin,** International Conference on the Role of the Polar Regions in Global Change, Fairbanks, June 11-15, 1990. Proceedings, Vol.1, Fairbanks, University of Alaska, Dec. 1991, p.58-62, 1 ref.

The polar automatic weather station (AWS) of the University of Wisconsin is a battery-powered, solar panel-charged, computer-controlled unit that measures wind speed, wind direction, air temperature, air pressure, vertical temperature difference, and relative humidity. The nominal height of the measurements is three to five m at the time of installation. The data are transmitted to polar-orbiting satellites equipped with the ARGOS data collection system. The sensors are measured at 10-min intervals, and 3-5 values of each sensor are transmitted at 200-sec intervals. More than 100 values at 10-min intervals are recorded in 24 hours. Thirty-four AWS units are installed in Antarctica and 4 AWS units are installed on the Greenland Crest. Up to 28 of the 38 AWS units are received by the Global Telecommunications System at six-hour intervals. (Auth.)

I-45986

Stone, R.S., Kahl, J.D., **Cloud radiative effects and associated changes in tropospheric temperatures and winds at the South Pole during austral winter,** International Conference on the Role of the Polar Regions in Global Change, Fairbanks, June 11-15, 1990. Proceedings, Vol.1, Fairbanks, University of Alaska, Dec. 1991, p.184-189, 20 refs.

Both the increasing concentrations of greenhouse gases and potential changes in cloud distributions are likely to affect the surface energy budget of the polar regions. Changes in the polar atmosphere are linked to dynamical processes that control the transport of mass, heat, and moisture from lower latitudes, and in turn feed back into the global circulation. An assimilation of radiation and meteorological data collected at Amundsen-Scott Station during the 1986 austral winter is analyzed to gain a better understanding of the relationships between cloud radiative effects, transport processes and the vertical distribution of temperature and wind. Parameters representing the intensity of temperature inversion and the bulk wind shear through the lower troposphere are suggested as appropriate indices for the detection of climate change in the region of the Antarctic Plateau. (Auth. mod.)

I-45987

Radok, U., Wendler, G., **Plateau weather: a synoptic study of IAGO and ANARE AWS observations in East Antarctica,** International Conference on the Role of the Polar Regions in Global Change, Fairbanks, June 11-15, 1990. Proceedings, Vol.1, Fairbanks, University of Alaska, Dec. 1991, p.192-198, 15 refs.

Automatic weather stations (AWS) have been operated for a number of years by U.S. and French scientists cooperating in Project Interactions Atmosphere, Glace, Ocean (IAGO) and by the Australian National Antarctic Research Expeditions (ANARE). Six of these stations are sufficiently close to one another on the East Antarctic Plateau for a synoptic interpretation of their observations. The data for 1987 have been reduced to a common format in order to identify episodes of regionally coherent changes. One of these episodes is described and used to outline steps that will be needed for clarifying the relative importance of the local energy balance and the large-scale circulation for the onset, duration, and cessation of katabatic winds on the plateau. (Auth.)

I-45988

Stewart, R.E., Lin, C.A., **Studies of -40 C isothermal layers at high latitudes,** International Conference on the Role of the Polar Regions in Global Change, Fairbanks, June 11-15, 1990. Proceedings, Vol.1, Fairbanks, University of Alaska, Dec. 1991, p.227-230, 11 refs.

Atmospheric soundings reveal that isothermal layers at temperatures near -40 C sometimes occur at high latitudes. In the absence of sufficient ice nuclei, supercooled water frozen by homogeneous freezing would act to produce such layers. The formation of these layers by homogeneous freezing should furthermore result in significant dynamic responses in the atmosphere. (Auth.)

I-45992

Walsh, J.E., Zwally, H.J., Weatherly, J.W., **Antarctic sea ice and temperature variations,** International Conference on the Role of the Polar Regions in Global Change, Fairbanks, June 11-15, 1990. Proceedings, Vol.1, Fairbanks, University of Alaska, Dec. 1991, p.263-268, 9 refs.

Monthly antarctic station temperatures are used in conjunction with grids of sea ice coverage in order to evaluate temporal trends and the strength of associations between the two variables at lags of up to several seasons. The trends of temperature are predominantly positive in winter and summer, but predominantly negative in spring. The spatially aggregated trend of temperature is small but positive, while the corresponding trend of ice coverage is small but negative. Cross-correlations between concurrent anomalies of the two variables are negative over most of the continent and are strongest over the Antarctic Peninsula, especially in winter. In regions other than the Antarctic Peninsula, lag correlations between seasonal anomalies are generally stronger, with ice lagging the summer temperatures and with ice leading the winter temperatures. (Auth.)

I-45993

Martinson, D.G., **Role of the southern ocean/sea ice interaction in global climate change,** International Conference on the Role of the Polar Regions in Global Change, Fairbanks, June 11-15, 1990. Proceedings, Vol.1, Fairbanks, University of Alaska, Dec. 1991, p.269-274, 18 refs.

The seasonal sea ice field of the southern ocean strongly modulates climate through its insulating effect and high albedo. Consequently, it plays a significant role in global climate, and must be adequately parameterized for inclusion in large-scale circulation models attempting to predict the nature of global change. Recent field studies and modeling work show that the ice field is highly sensitive to the static stability and vertical fluxes in the southern ocean water column. Given the marginal stability and strong fluxes of the present-day water column, relatively small changes in the ocean/atmosphere may lead to significant changes in the stability or fluxes and thus the nature of the sea ice cover. These interactions link the local- and regional-scale processes to the global-scale processes, forming a southern ocean/climate feedback loop. The local-scale processes operate at sub-grid scales in most climate models; therefore the results of a local process-oriented model are reviewed to examine the nature of the local-regional interactions which are critical to this system. (Auth. mod.)

I-46010

Amos, A.F., **RACER: meteorological conditions during the spring bloom in the Gerlache Strait,** *Antarctic journal of the United States,* 1990 25(5), p.128-131, 5 refs.

This study of the local meteorological conditions in the Gerlache Strait was done as part of the RACER (Research on Antarctic Coastal Ecosystems and Rates) study in 1989. Two weather stations were installed, one aboard the R/V *Polar Duke* and the other on an island near Lobodon I., which was named "RACER Rock," pending formal acceptance of that name by the Geographic Board of Names. The following is found noteworthy: winds on "RACER Rock" were less energetic than in the whole RACER study area; diurnal humidity and temperature variations were much greater on "RACER Rock," indicating a less "maritime" regime there than over the open waters; there was a gradual rise in air and sea temperature as the month progressed over the open water; air temperature was almost always colder than sea temperature; reversals in wind direction were more frequently observed on *Polar Duke* than on "RACER Rock" where periods of several days of wind blowing to the southwest prevailed, especially in Dec. In both places, winds coming off the antarctic continent brought colder, drier air. A table shows a summary of conditions during Nov., starting when "RACER Rock" became operational.

I-46043

Hogan, A.W., **Polar climate iteration?,** MP 3066, International Conference on the Role of the Polar Regions in Global Change, Fairbanks, June 11-15, 1990. Proceedings, Vol.2, Fairbanks, University of Alaska, Dec. 1991, p.681-686, 38 refs.

A continuous series of surface observations began at South Pole in 1974 and have continued to the present. Although a large seasonal variation in aerosol concentration is present, little year-to-year variation in mean seasonal aerosol concentration occurred prior to 1982. During the mid-1980s, a consistent diminution of mean annual aerosol concentration was observed, and a concurrent reduction in sodium concentration in snow and firn was reported. The decrease in aerosol concentration was greatest in late winter and spring, concurrent with decreases in mean air temperature and mean wind speed. This paper describes concurrent aerosol and meteorological data collected at South Pole from 1974 through 1987 and presents several analyses attempting to verify if these changes do reflect a persistent variation in the properties of the antarctic continental air mass. Additional analyses, using upper air and automatic weather station data, attempt to identify circulation changes related to these changes in aerosol concentration. (Auth. mod.)

I-46044

Lal, M., **Depletion in antarctic ozone and associated climatic change,** International Conference on the Role of the Polar Regions in Global Change, Fairbanks, June 11-15, 1990. Proceedings, Vol.2, Fairbanks, University of Alaska, Dec. 1991, p.703-706, 15 refs.

The potential climatic effects of changes in the concentration of greenhouse gases on thermal structure of the antarctic atmosphere are examined, using both steady-state and time-dependent climate models. When the greenhouse effects of increases in methane, nitrous oxide, carbon dioxide and chlorofluorocarbons in association with decrease in ozone at the levels of maximum concentration are incorporated in radiative flux computations for the antarctic region, the net result is a surface warming which is in fair agreement with that inferred from mean antarctic temperature series. The stratospheric cooling due to the ozone hole phenomenon is not restricted only to the low and middle stratosphere but also extends deep into the upper antarctic stratosphere, particularly in the beginning of Nov. In view of this, it is considered possible that the polar stratospheric warming phenomenon associated with planetary wave events could be significantly disturbed by ozone depletion in the antarctic atmosphere, leading to appreciable perturbations in the general circulation. (Auth. mod.)

I-46045

Iwasaka, Y., **Seasonal change and chemical state of polar stratospheric aerosols,** International Conference on the Role of the Polar Regions in Global Change, Fairbanks, June 11-15, 1990. Proceedings, Vol.2, Fairbanks, University of Alaska, Dec. 1991, p.720-729, 23 refs.

Winter enhancement of stratospheric aerosols was measured at Showa Station by lidar. Electron microscope observation of individual particles, collected in the winter arctic stratosphere with a balloon-borne impactor, suggested that particles containing nitric acid were formed during the cold winter season, and the appearance of such particles was an important process causing the winter enhancement of polar stratospheric aerosols. An externally mixed state of nitric acid and sulfate particles was observed in the region of 18.8-19.6 km (the upper region of the sulfate particle layer) during the measurements of Jan. 31, 1990. One possible explanation of this is nitric acid particle sedimentation, which is considered to be an important process causing denitrification of the polar stratosphere and polar ozone depletion. (Auth. mod.)

I-46046

Mokhov, I.I., **Ozone evolution peculiarities in the polar regions: analysis of observational data and results of modeling,** International Conference on the Role of the Polar Regions in Global Change, Fairbanks, June 11-15, 1990. Proceedings, Vol.2, Fairbanks, University of Alaska, Dec. 1991, p.736-740, 7 refs.

Analysis of ozone evolution characteristics in intra-annual evolution of latitude-altitude and latitude-longitude atmospheric ozone concentration fields was carried out using a special method of amplitude-phase characteristics. TOMS satellite ozone data for the period 1978-1987 were used in the analysis. Comparison was made with results of analysis of total ozone evolution based on data obtained from the World Data Center of Ozone and from the Main Geophysical Observatory for the period 1973-1985 at 133 Northern and Southern Hemisphere stations. Latitude-altitude characteristics of the evolution of ozone concentrations from different satellite data are compared with results of simulations using a two-dimensional photochemical model of the atmosphere. There are large differences in ozone evolution in polar latitudes of the Northern and Southern Hemispheres in different stratospheric layers and for different seasons. It was noted that the "ozone hole" phenomenon is more pronounced in the Antarctic than in the Arctic. Comparison with results of standard harmonic analysis was also carried out. (Auth.)

I-46047

Stolarski, R.S., **Measured trends in stratospheric ozone,** *Science,* Apr. 17, 1992 256(5055), p.342-349, Refs. passim.

Recent findings, based on both ground-based and satellite measurements, have established that there has been an apparent downward trend in the total column amount of ozone over mid-latitude areas of the Northern Hemisphere in all seasons. Measurements of the altitude profile of the change in the ozone concentration have established that decreases are taking place in the lower stratosphere in the region of highest ozone concentration. Analysis of updated ozone records through Mar. 1991, including 29 stations in the former Soviet Union, and analysis of independently calibrated satellite data records from the Total Ozone Mapping Spectrometer and Stratospheric Aerosol and Gas Experiment instruments, confirm many of the findings originally derived from the Dobson record concerning northern mid-latitude changes in ozone. The data from many instruments now provide a fairly consistent picture of the change that has occurred in stratospheric ozone levels. An antarctic ozone hole update is included and several of the graph figures extend the survey to about 65S. (Auth. mod.)

I-46060

Rowland, F.S., **Chlorofluorocarbons, stratospheric ozone, and the antarctic ozone hole,** *Environmental conservation,* Summer 1988 15(2), p.101-115, 69 refs.

The momentous subject of chlorofluorocarbons (CFCs) and their effect on the biosphere's stratospheric ozone shield is treated rather generally, but in sufficient depth where necessary in three main sections dealing with (i) scientific background and current status of ongoing investigation, (ii) the major technological uses of CFCs and available or foreseeable alternatives to them, and (iii) the policy status and regulatory activity involving present or proposed future restrictions in CFC emissions. The general areas of major concern focus on the twin roles of ozone as: (a) a stratospheric shield against the penetration to the Earth's surface of biologically damaging ultraviolet radiation in the 280-320 nm wavelength band (designated as UV-B), and (b) the conversion of this energy absorbed by ozone into a stratospheric heat-source. A decrease in total ozone in the atmosphere permits increased penetration of UV-B in the ratio of -1% in O3+2% in UV-B. The major direct effects of increased UV-B on man are increased incidences of skin cancer and eye cataracts, and perhaps some suppression of the immune system.

I-46061

d'Almeida, G.A., Koepke, P., Shettle, E.P., **Atmospheric aerosols—global climatology and radiative characteristics,** Hampton, VA, A. DEEPAK Publishing, 1991, 561p., Refs. passim.

DLC QC882.42.D35 1991

This book fills a current need for global aerosol climatology. The authors have carefully reviewed most of the available aerosol measurements. After describing the various sources of aerosols and the characteristics needed in a climatology, they define 22 aerosols and components by their size distribution and their refractive index from 0.3 to 40 microns. These components are used in external mixtures to build 12 aerosol types, distributed over the globe in bins of 5 deg x 5 deg and 3 or 4 altitude layers; the time resolution is a month, and the effect of relative humidity is included. This basic aerosol climatology is then used to compute radiative characteristics, based on Mie theory; some maps are presented as examples of this large data set. This book is an invaluable document to modellers and to all those who need information on the atmospheric aerosols. It also provides a framework for further work by the international community in its efforts to combine current and future aerosol measurements into an interactive database. (Auth. mod.)

I-46064

Boutron, C.F., Candelone, J.P., Görlach, U., **Ultra-trace analysis of heavy metals in ice and snow from the Antarctic and Greenland,** *Analusis,* Mar. 1992 20(3), p.M24-M27, 16 refs.

A record of the changes in concentrations of Pb, Cd, Hg and other heavy metals in the atmosphere of both hemispheres from prehistoric times to the present has been preserved in the successive dated ice and snow layers deposited in the large Greenland and antarctic ice caps. This paper describes the laboratory techniques required to decipher these archives, which has proved to be a major analytical challenge, due to the unique purity of polar ice and snow. At the extremely low concentrations involved, clean laboratories and ultrasensitive and contamination-free analytical techniques are required. (Auth. mod.)

I-46066

Yuen, C.W., Cherniawsky, J.Y., Lin, C.A., Mysak, L.A., **Upper ocean general circulation model for climate studies: global simulation with seasonal cycle,** *Climate dynamics,* Feb. 1992 7(1), p.1-18, 60 refs.

In this paper the global ocean circulation with a seasonal cycle has been simulated with a two-and-a-half layer upper-ocean model. This model was developed for the purpose of coupling to an atmospheric general circulation model for climate studies on decadal time scales. A thermodynamic sea-ice model is coupled to the mixed layer. The model is forced at the surface with seasonally varying (a) observed wind stress, (b) heat fluxes, as defined by an atmospheric equilibrium temperature, and (c) Newtonian-type surface salt fluxes. The overall global distributions of mixed layer temperature, salinity and thickness are favorably reproduced. Sea ice distributions agree well with observations except in the interiors of the Ross and Weddell Seas. A realistic time rate of change of heat storage is simulated. There is also realistic heat transport from low to high latitudes. (Auth. mod.)

I-46078

Lee, B.Y., Nam, J.C., **Studies on the characteristics of meteorological elements at King Sejong Station,** *Korean journal of polar research,* Dec. 1991 2(2), p.3-27, In Korean with English summary. 10 refs.

Various surface meteorological elements are being observed at King Sejong Station continuously. In this study, emphasis is given to the analysis of wind, pressure, temperature and blizzards recorded in 1990. Annual average wind speed was 7.8 m/s and predominant wind direction was northwest. From Jan.-Dec, the greatest gust was 46.6 m/s at 20:00LST on June 16. Annual average pressure was 986.7 mb (maximum 1027 mb, minimum 951 mb) and annual average temperature was -1.9 C (maximum 8.1 C, minimum -21.6 C). At King Sejong Station, blizzards were observed 22 times for 296 hours from Jan.-Oct. The longest blizzard persisted for 58 hours and 30 minutes, from 07:30LST (11:30 GMT) Apr. 6 to 18:00LST, Apr. 8. During the blizzards, the strongest pressure gradient was recorded as 23 mb (953-976 mb) on Aug. 20. Most blizzards occurred with winds from SE and were located behind depressions or following the depressions. Severe weather phenomena are caused by extreme pressure patterns and topographic effects at King Sejong Station as well as at other stations in the Antarctic. (Auth. mod.)

I-46087

Fitch, M., Carleton, A.M., **Antarctic mesocycle regimes from satellite and conventional data,** *Tellus,* Mar. 1992 44A(2), Polar Meteorology Symposium, Copenhagen, Denmark, Apr. 1990. Selected papers, p.180-196, 42 refs.

Mesoscale vortices in the Antarctic poleward of 50S are examined in the synoptic context for the Ross Sea sector for transition and winter months of 1988, using DMSP (Defense Meteorological Satellite Program) thermal infrared (TIR) images. Mesoscale vortices are classified and tracked, and the dominant characteristics are defined and discussed. A "superposed epoch" (compositing) method using 1000 and 500 mb height data identifies the dominant synoptic regimes in which mesoscale vortices tend to develop. This analysis indicates that during active or outbreak periods, a negative thickness anomaly ("cold pool") is located northeast of the Ross Sea, and mesoscale vortices tend to occur on the poleward side of that anomaly. In addition, an enhanced trough-ridge pattern is evident for the Ross Sea sector compared with the composite pattern for inactive, or dearth, periods. The active periods of mesoscale vortices appear to originate from Antarctica, possibly via the persistent katabatic outflows from the ice sheet, rather than from teleconnections to lower latitudes. Analysis of Automatic Weather Station (AWS) data for the Ross Sea region supports this notion, at least for individual cases. Confirmation of these findings for the corresponding months of additional years is continuing. (Auth. mod.)

I-46091

Stefanutti, L., Morandi, M., Castagnoli, F., Sacco, V.M., **Statistics of the cloud evolution during the antarctic summer at the Italian base,** International Laser Radar Conference, June 1988. Conference abstracts, [1988], p.32-35, 3 refs.

A lidar system was installed at the Italian base of Terra Nova Bay at 75S 165E. The system operated from Dec. 30, 1987 to Feb. 15, 1988. Measurements were carried out regularly each day, starting at 8:30 in the morning to 17:00 hours, weather permitting. The following measurements were carried out: cloud bases, identification of different layers of clouds, cloud velocities by combined TV images and lidar data, and depolarization measurements. (Auth.)

I-46093

Chittleborough, R.G., **Potential impacts of climate change on the southern ocean system,** *Queensland Museum. Memoirs,* July 1, 1992 30(2), p.243-247, 16 refs.

Global climate change has the potential to disrupt the delicately poised thermal balance in surface waters of the southern ocean around Antarctica, threatening this highly productive ecosystem with severe and permanent collapse. Pivotal in this process is a diminution of the important (but little studied) CO2 sink in the southern ocean, resulting in a series of feedback loops accelerating global warming and intensifying impacts upon the southern ocean ecosystem. As well as outlining the processes involved and stressing the urgent need for further research, this paper underlines our wider social responsibilities to press for fresh policies essential to arrest the global changes before irreversible harm is done to the antarctic environment and ecosystems, with their global consequences to our life support system. (Auth.)

I-46098

Mancini, E., Pitari, G., Visconti, G., **Dehydration in the antarctic stratosphere: radiative effects,** *Geophysical research letters,* Mar. 20, 1992 19(6), p.585-588, 24 refs.

A two-dimensional model is used to investigate the effects of polar stratospheric clouds on the water vapor budget in the antarctic stratosphere. It is shown that loss of stratospheric water vapor through formation and sedimentation of large ice particles decreases infrared cooling. This cooling reduction partially compensates the decreased ozone heating due to the formation of the antarctic hole. Such a conclusion is reached by comparing a control unperturbed situation with two cases in which an ozone hole is formed with and without polar dehydration. It is demonstrated that in the case of substantial loss of stratospheric water vapor since the years of the ozone hole formation, a dynamical mechanism may be necessary to explain the observed stratospheric cooling during the antarctic spring. In this case the combined radiative perturbation ($H2O+O3$) is too small to force this cooling. Instead, in the case of a negligible change of water vapor content, the O3 radiative perturbation could be entirely responsible for the observed secular cooling. (Auth.)

I-46103

Cuddapah, P., Yoo, J.M., **Remote sensing over oceans of optically thin cirrus and its significance,** *SPIE—The International Society for Optical Engineering. Proceedings,* 1990 Vol.1299, Long-term monitoring of the earth's radiation budget. Edited by B.R. Barkstrom, p.154-173, 16 refs.

DLC QC809.E6L66 1990

From spectral data obtained by the Infrared Interferometer Spectrometer (IRIS) flown on the Nimbus 4 satellite in 1970, the extinction characteristics of thin ice crystal clouds over the oceanic convective rain belts in the tropics and midlatitudes were examined. The optical depth of these clouds in the IR window region is <3 and their spectral features are consistent with cloud particle size of approx. 10

microns. These optically thin ice crystal clouds are extensions of the anvil clouds generated by deep convective systems. The IRIS data also indicate the existence of optically thin ice clouds that extend from the upper troposphere into the lower stratosphere in the polar regions during winter and early spring. Radiative transfer calculations suggest that the equivalent ice water content of these polar clouds is of the order of 1 to 2 milligram per sq cm. It is suggested that the 'ozone hole' in the region of the Weddell Sea is linked, at least in part, to these ice crystal clouds. (Auth. mod.)

I-46108

Zakharov, V.G., Khmelevskaia, L.V., **Glacioclimatic characteristics of antarctic glaciers as a reflection of general planetary atmospheric processes** [Gliatsioklimaticheskie kharakteristiki antarkticheskikh lednikov—otrazhenie obshcheplanetarnykh atmosfernykh protsessov], *Akademiia nauk SSSR. Institut geografii. Materialy gliatsiologicheskikh issledovaniĭ,* Oct. 1990 Vol.70, p.23-29, In Russian with English summary. 25 refs.

The main features of the global circulation of the atmosphere are meridional and zonal forms of transfers. It is noteworthy that the interrelations between their duration are not permanent and respond to climatic fluctuations. This relationship also changes throughout the year, especially in spring and in autumn during transitional periods of the rearrangement of the baric field of the Earth. This is mainly caused by the abrupt change of the polar night by the polar day, seasonal changes of the underlying surface, the growth of temperature contrasts and some other factors. Considerable temperature contrasts contribute to the development of active meridional transfers, in the course of which the synchronism of the atmospheric circulation of the Northern and Southern Hemispheres is pronounced. Analysis of the perennial changes in the duration of spring and pre-winter circulation seasons of the Northern Hemisphere and long-term changes in the antarctic glacier fluctuations and snow accumulation in Central Antarctica have shown that a certain relationship exists between the two latter properties. This relationship is based on the dependence of the disintegration of the floating part of Antarctica on the rate of cyclonic activity. Interpretation of the data has shown that in 1881-1970 the long-term changes in the duration of spring and pre-winter circulation seasons of the Northern Hemisphere and the changes in glacioclimatic indices of Antarctica were synchronous and reflected the global nature of seasonal atmospheric processes of the transitional periods. (Auth. mod.)

I-46110

Kotliakov, V.M., **Has European cooperation begun in Antarctica** [Nachalo evropeĭskogo sotrudnichestva v Antarktide?], *Akademiia nauk SSSR. Institut geografii. Materialy gliatsiologicheskikh issledovaniĭ,* Oct. 1990 Vol.70, p.122,156, In Russian.

This is a report on the seminar "The Paleoclimate of Antarctica Based on Ice Core Data" held in Grenoble, France, Oct. 29-30, 1990. Twenty representatives from 7 different European countries, as well as from Australia, the U.S., U.S.S.R. and Japan participated. As a result of this meeting, the following priorities were established: deep ice core drilling of Dome A, encompassing at least 2 climatic cycles; deep drilling of the Queen Maud Land plateau along with a study of recent processes in this part of East Antarctica; and combined investigations in West Antarctica with deep ice drilling, to study rapid changes in "marine" ice sheets.

I-46136

Ciais, P., **Evidence for an early Holocene climatic optimum in the antarctic deep ice-core record,** *Climate dynamics,* Jan. 1992 6(3-4), p.169-177, 60 refs.

This paper is focused on the Dome C and Vostok cores and on a new 850-m long ice core drilled out at Komsomolskaia by the Soviet Antarctic Expeditions in an attempt to clarify stable isotope content in terms of air temperature variations. These three sites are located in East Antarctica on the antarctic plateau, in a region essentially undisturbed by ice-flow conditions, so that their detailed intercomparison may allow the identification of the climatically significant isotopic signal. Results compare well with the proximal records of Southern Hemisphere high latitudes, and support the existence of a warmer "climatic optimum" between 10 and 6 ka y BP. Maximum temperatures are reached just at the end of the last deglaciation, which confirms previous observations at high latitudes, in contrast with later dates for the Atlantic and hypsithermal optima in Europe and North America. (Auth. mod.)

I-46155

Corazza, E., Tesi, G., **Carbon oxides and hydrogen in antarctic atmosphere,** Antarctica Project. Environmental impact: chemical methodologies, [Rome, Italian Research Council, 1991], p.439-451, Reprinted from Annali di chimica, 1991, Vol.81(7-8 and 9-10). 22 refs.

During the 1989-90 Italian expedition to Antarctica some atmospheric trace components were analyzed (CO2, CO, H2) at a location approximately 0.5 km NW of the Terra Nova Bay Station. Air samples were analyzed *in situ* at 3 hour intervals by means of an automated gas-chromatograph (GC) equipped with RGD detector (H2 and CO) and by a GC with methanizer and FID detector (CO2). The concentrations found for H2 and CO2 (averages of 531 ppbv and 354 ppmv respectively) are representative of those elsewhere in the world, thus reflecting their long lifetimes. The CO is definitely low (short lifetime) and comparable with high-latitude open sea averages of 55 ppbv. Concentrations of CO were found to depend on wind direction. Continental winds were associated with the lowest concentrations; average was 51 ppbv. (Auth. mod.)

I-46159

Crescentini, G., Maione, M., Bruner, F., **Measurements of tropospheric concentration of halocarbons in Antarctica,** Antarctica Project. Environmental impact: chemical methodologies, [Rome, Italian Research Council, 1991], p.491-501, Reprinted from Annali di chimica, 1991, Vol.81(7-8 and 9-10). 16 refs.

Data on halocarbon concentration levels at Terra Nova Bay, obtained in Jan.-Feb. 1990, are reported. The measurements were carried out *in situ,* by GC-ECD analysis of 50 mL of air sampled on line, and in the laboratory, by GC-MS analysis of 1-2 L samples collected in Antarctica. Permeation tubes were used for calibration and the heat-stripping technique was used to introduce the sample into the GC column. Strong contamination, probably caused by emissions from the Terra Nova Bay Station, was observed. (Auth.)

I-46167

Michetti, I., Perini, A., Testa, L., **Environmental impact of the Italian antarctic station at Terra Nova Bay,** Antarctica Project. Environmental impact: chemical methodologies, [Rome, Italian Research Council, 1991], p.579-587, Reprinted from Annali di chimica, 1991, Vol.81(7-8 and 9-10). 4 refs. For another version of this article see 19I-44337.

Studies on environmental impact of the Terra Nova Bay Station began during the 1986/87 expedition and have been carried on in the following years. Airborne particulate matter has been sampled and analyzed; water treatment plant and incinerator monitoring were planned and performed at the Station. A review of the four year activity is presented; a noticeable increment in the elements V, Fe, Al and Mn occurred over this time. (Auth. mod.

I-46170
Mittner, P., **Multielemental characterization of aerosol at Terra Nova Bay. Preliminary results of the fine component during the 1990-91 austral summer,** Antarctica Project. Environmental impact: chemical methodologies, [Rome, Italian Research Council, 1991], p.605-613, Reprinted from Annali di chimica, 1991, Vol.81(7-8 and 9-10). 6 refs.

Aerosol sampling has been performed at Campo Icaro, in the vicinity of the Terra Nova Bay Station in the period between Nov. 1990 and Feb. 1991. The duration of the sampling intervals was approximately 12 hrs and a special aerosol sampler was used, with separation of the coarse and fine components. Aims and methods of the experiments are presented, as well as the results of a PIXE analysis of 89 samples of the fine component, collected on Nuclepore filters. Mean values and standard deviations of volume concentrations (ng/cu m) are given for the following elements: Si, S, Cl, K, Ca, Ti, Mn, Fe, Ni, Cu, and Zn. (Auth.)

I-46207
Hughes, T.J., **Abrupt climatic change related to unstable ice-sheet dynamics: toward a new paradigm,** *Global and planetary change,* Mar. 1992 5(3), p.203-234, Refs. p.231-234.

In this paper, a new paradigm is postulated in which abrupt climatic change is driven by iceberg outbursts associated with life cycles of marine ice streams, and dust storms associated with life cycles of terrestrial ice streams. For Pleistocene Northern Hemisphere ice sheets, these mechanisms regulated North Atlantic surface temperatures and salinity, and perhaps planetary albedo and atmospheric CO2, and thereby drove climatic change, which tended to be abrupt because ice-stream life cycles began and ended abruptly. A portion of these ice sheets was subjected to the unstable life cycles of ice streams, as seen in the pronounced spikiness of the late glacial oxygen isotope stratigraphy in the Greenland ice core at Dye 3. Life cycles of Greenland ice streams during the Holocene seem to be linked to episodes of regional climatic cooling; most recently, the Little Ice Age. When superimposed on the present Milankovitch hemicycle of reduced insolation over the North Atlantic, this could abruptly initiate a new worldwide glaciation cycle in the aftermath of present-day CO2 "greenhouse" warming. Proliferation of antarctic ice-stream life cycles during the period of "greenhouse" warming may also trigger global climatic change by forcing a reorganization of circumpolar thermohaline circulation in the southern ocean. (Auth. mod.)

I-46252
Smith, V.R., **Atmospheric carbon dioxide levels at Marion Island,** *South African journal of science,* Oct. 1991 87(10), p.535-536, 6 refs.

The Geophysical Monitoring for Climate Change (GMCC) division of NOAA has monitored atmospheric CO2 concentrations at a number of remote locations since 1968. One of the objectives of the monitoring program is to determine the magnitudes of sources, sinks and atmospheric transport of CO2 in order to improve estimates of the global atmospheric budget of this 'greenhouse' gas. This will allow better predictions of future trends in atmospheric CO2 levels and the possible climatic implications. Between 1982 and 1991, CO2 concentrations on the island increased on average by 1.2 ppm per year. Similar increases occurred at Macquarie I., *(ca.* 1.4 ppm/yr), Amsterdam I., *(ca.* 1.3 ppm/yr) and at Mawson *(ca.* 1.3 ppm/yr. At Palmer Station and the South Pole, annual increases in CO2 concentrations appear to have been greater *(ca.* 1.6-1.8 ppm), at least until 1982. Reported here for the first time are atmospheric CO2 concentrations measured at Marion I. on four occasions over the past 13 years. This represents a very scant data set for an area where there is a great need for information on atmospheric trace gas concentrations.

I-46255
Pereira, E.B., Loureiro, A.L.M., Vasconsellos, M.B.V., **Reconnaissance of elemental composition in aerosols of the Antarctic Peninsula,** *Atmospheric environment,* June 1992 26A(8), p.1549-1550, 5 refs.

The composition of subantarctic aerosols, collected during 1986/1987 in the Brazilian coastal station Ferraz, is presented. The soil dust components Al and Mn were about 30 times larger than at the South Pole. Yearly averages of Al, Mn, Na, Cl and trace radon gas presented higher values during 1986 when higher winds prevailed. The trace metals Zn and Sb exhibited a clear seasonal trend with a minimum during winter. (Auth. mod.)

I-46294
Peng, T.H., Broecker, W.S., **Factors limiting the reduction of atmospheric CO2 by iron fertilization,** *Limnology and oceanography,* Dec. 1991 36(8), p.1919-1927, 23 refs.

Details of an advection-diffusion model of the ocean-atmosphere system are outlined to show the parameters used in its construction. These include: *p*CO2, CO2 reduction, upwelling flux, vertical density, and gas exchange rate. The key parameters are the upwelling rate and the fate of upwelled water. The length of the productive season influences the extent of *p*CO2 reduction. For 8 months of productive fertilization this model yields a reduction of 60 micro atm, for 4 months a reduction of 50 micro atm, and for 2 months a reduction of 40 micro atm. The maximum O2 consumption in the standard case is estimated to be 133 micro mol/kg at a depth of 600 m. However, O2 consumption depends on the reoxidation function in the subsurface water. If the organic flux reoxidizes completely in the upper 2,000 m, the maximum consumption of O2 at 500 m could reach 500 micro mol/kg. Hence, depending on the reoxidation function, an anoxic antarctic thermocline could result from Fe fertilization. Both calculations regarding the seasonality of production and those regarding oxygen reduction are highly sensitive to parameters over which there is little control. They are included only to emphasize their potential importance. (Auth. mod.)

I-46322
Lubin, D., Frederick, J.E., **Observations of ozone and cloud properties from NSF ultraviolet-monitor measurements at Palmer Station, Antarctica,** *Antarctic journal of the United States,* 1990 25(5), p.241-242, 2 refs.

The National Science Foundation scanning spectroradiometer at Palmer Station provides hourly ground-based measurements of solar ultraviolet irradiance. In addition to defining the ultraviolet radiation environment of the region, these measurements allow the derivation of the column density of atmospheric ozone above the station nearly every daylight hour. This hourly time resolution, not generally available from other methods of monitoring antarctic ozone abundances, enables the detection of large and rapid changes in total column ozone and ultraviolet surface irradiance associated with the dynamics of the polar vortex. In conjunction with a daily record of sky conditions and radiative transfer modeling, the ultraviolet-monitor measurements permit a quantitative understanding of the role of cloud cover in regulating ultraviolet radiation levels at the antarctic Earth surface.

I-46323
Deshler, T., Hofmann, D.J., Hereford, J.V., Sutter, C.B., **Vertical profiles of ozone and aerosol at McMurdo Station, Antarctica in the spring of 1989,** *Antarctic journal of the United States,* 1990 25(5), p.243-244, 4 refs.

Ozone and temperature profiles were measured in 39 balloon flights at McMurdo Station from Aug. 23 to Oct. 30, 1989. Optical particle counters were included on 4 flights to measure condensation nuclei (radii=0.01 micron) and 5 flights to measure polar stratospheric cloud particles with the new high-flow-rate aerosol counter (radii=0.15 micron to 5.0 microns). In 1989, as in previous years, ozone depletion occurred in the 12-20 km layer, was episodic, occurring rapidly in two periods of less than 5 days, appeared to be tied to temperatures below -70 C, and recovered initially above 20 km with an influx of ozone-rich air from mid latitudes. A time history of ozone and temperature in the spring is shown in a figure for the years 1986-1989. Comparison of 1987 and 1989 suggests that only certain minimum meteorological conditions are required for chemical destruction of ozone to proceed to completion, and that prolonging those conditions would probably not lead to significant further depletion.

I-46324

Murcray, F.J., Heuberger, R., **Infrared atmospheric absorption and emission measurements,** *Antarctic journal of the United States,* 1990 25(5), p.244-246.

In Dec. 1989, a project was started at Amundsen-Scott Station, with an emission spectrometer being installed on the roof of Skylab to obtain data for water, carbon dioxide, ozone, fluorocarbon-11 and -12 and nitric acid in the wave number region from 600 to 1,500/cm. The instrument runs during winter, monitoring the change in concentration of the components during the long absence of sunlight. A sample spectrum taken during the installation and checkout period on Dec. 5 is shown in a figure.

I-46325

Rosen, J.M., Kjome, N.T., Oltmans, S.J., **Study of polar stratospheric clouds at the South Pole,** *Antarctic journal of the United States,* 1990 25(5), p.246, 2 refs.

A project centered on balloonborne measurements of polar stratospheric clouds and frost point in the nighttime stratosphere over Amundsen-Scott Station is described. During part of the year, satellite observations of polar stratospheric clouds are not available. The water-vapor measurements help identify the processes important in the formation of polar stratospheric clouds; in addition, they detail the dehydration of the antarctic stratosphere. The polar stratospheric cloud measurements are accompanied by simultaneous ozone measurements using the same instrument package and digital-data telemetry system.

I-46326

Hanson, K.J., **South Pole Station temperature chronology and the global warming problem,** *Antarctic journal of the United States,* 1990 25(5), p.247-249, 5 refs.

The 33 years of temperature observations at the Amundsen-Scott Station (1957-1989) have been used to determine monthly variability and "normals," as indicated in a figure and a table. The normals show that the warmest month is Dec. (-27.9 C) and the coldest month is July (-60.0 C). The chronology of the Station's annual average temperatures for the period 1957-1989 is given in a figure. There is no apparent warming over the 33-year period. The chronology shows unusually cold years in 1983 and 1987. For the purpose of obtaining temperature trend information for the South Pole, it would be useful to identify, and to the extent possible to remove, interannual-scale temperature anomalies. There are two meteorological variables that appear to account, in part, for the temperature anomalies of 1983 and 1987: wind speed and wind direction.

I-46327

Khalil, M.A.K., Rasmussen, R.A., **Relationship between atmospheric methane and global climate,** *Antarctic journal of the United States,* 1990 25(5), p.249-251, 8 refs.

Studies are discussed which have clearly established that the concentration of atmospheric methane is closely related to the global climate. A synthesis of recent work on the relationship between global climate and the methane cycle is reported. Figures are presented illustrating the relationship.

I-46328

Hall, B.D., **Improvements in nitrous oxide and halocarbon measurements at the South Pole,** *Antarctic journal of the United States,* 1990 25(5), p.252-253, 7 refs.

The study of N2O and halocarbons at the Amundsen-Scott Station by the Climate Monitoring and Diagnostics Laboratory has progressed from the periodic measurement of flask samples for 3 gases to continuous *in situ* measurement of 6 gases. The system has been improved each year and now delivers highly precise and accurate measurements that can be monitored throughout the year. Because of the increased sampling frequency, one can monitor not only global trends but can begin to evaluate smaller changes over shorter time scales.

I-46329

Stearns, C.R., Weidner, G.A., **Antarctic automatic weather stations: austral summer 1989-1990,** *Antarctic journal of the United States,* 1990 25(5), p.254-258, 6 refs.

The National Science Foundation's Division of Polar Programs places automatic weather station units in remote areas of Antarctica in support of meteorological research and operations. The automatic weather station data are collected by the ARGOS Data Collection System on board the National Oceanographic and Atmospheric Administration (NOAA) series of polar orbiting satellites. The basic units measure air temperature, wind speed, and wind direction at a nominal height of 3 m above the surface, and air pressure at the electronics enclosure. Some units may measure relative humidity at 3 m and the temperature difference between 3 m and 0.5 m above the surface. A table gives the ARGOS identification number, latitude, longitude, elevation, and the latest start date for antarctic automatic weather station units operating during 1990. Three figures show the locations for the units, units in the vicinity of the Reeves Glacier, and the units on the Ross Ice Shelf near Ross I., respectively. Some automatic weather station units are located in arrays for meteorological experiments and others for operational purposes.

I-46330

Stearns, C.R., Weidner, G.A., **Wind speed events and wind direction at Pegasus site during 1989,** *Antarctic journal of the United States,* 1990 25(5), p.258-262, 3 refs.

On Jan. 22, 1989, an automatic weather station unit (Pegasus site) was installed on the Ross Ice Shelf between the ice shelf edge and White and Black islands at the blue ice region being considered for an aircraft runway. The purpose of the weather station unit was to monitor the meteorology of the blue ice region to find out if the site is satisfactory for aircraft operations. Tabulated data are presented showing the mean temperature, mean wind speed, maximum temperature, and maximum wind speed for Pegasus and nearby automatic weather station units. The average wind speed is 0.9 m/s less at Pegasus site than at Ferrell site. The big difference between Ferrell and Pegasus sites is in the maximum wind speed for each month. The average maximum wind speed for the period Feb. through Oct. 1989 is 7.3 m/s higher at Pegasus site than at Ferrell site.

I-46331

Parish, T.R., Bromwich, D.H., **Numerical simulation of the katabatic wind circulation over the antarctic continent,** *Antarctic journal of the United States,* 1990 25(5), p.262-264, 8 refs.

Numerical experiments have been made to address the development of the katabatic wind circulation over the antarctic continent and to assess the relationship between the katabatic wind regime and the circumpolar vortex. A three-dimensional version of the numerical model described in Parish and Waight (1987) was used in this study of antarctic surface winds. To isolate the katabatic wind influence, the model was initiated about a state of rest with no synoptic-scale wind systems present. A parameterized form of radiation was used to drive the model; the model equations were integrated for a 48 hour period. The pattern of katabatic wind speed over the entire continent after the 48 hour time integration is shown in a figure. To illustrate the development of the circumpolar vortex, the 500- and 250 hectopascal geopotential height field was computed regularly during the course of the model integration. The geopotential height patterns at the 500- and 250 hectopascal levels after the model integration period of 48 hours are shown in a figure.

I-46332
Wendler, G., André, J.C., **Winds in the coastal area of Adélie Land,** *Antarctic journal of the United States,* 1990 25(5), p.265-267, 9 refs.

The difference in wind speed caused by location is discussed, based on records at Cape Denison for Feb. 1912-Oct. 1913 and Feb. 1990, and at Port Martin and Dumont d'Urville stations for Feb. 1990. These records are shown and analyzed, and it is concluded that it is impossible to obtain conclusive evidence as to which area has the highest wind speeds.

I-46333
Bromwich, D.H., Parish, T.R., Pellegrini, A., **Katabatic wind regime near Terra Nova Bay, Antarctica,** *Antarctic journal of the United States,* 1990 25(5), p.267-269, 12 refs.

An automatic weather station has been operating on Inexpressible I. since 1984; 4 additional units were deployed at strategic locations in and around Terra Nova Bay during the 1987-1988 summer in support of this study. Results from the automatic station network for the calendar year Feb. 1988-Jan. 1989 are summarized in this article. It is noted that significant amounts of data are missing for the period indicated; the reasons for the gaps, and how they were taken into account, are discussed.

I-46374
Anderson, P.S., **Microbarograph for internal gravity wave studies in Antarctica,** *Antarctic science,* June 1992 4(2), p.241-248, 23 refs.

Measurement of pressure fluctuations provides the best means of detecting atmospheric internal gravity waves at the Earth surface. An instrument was developed which is sufficiently sensitive to detect the small pressure fluctuations associated with such waves, yet robust enough for deployment in an antarctic environment. The instrument incorporates several novel features, both in its design and in the method of deployment used. A prototype instrument has been successfully deployed at the British Antarctic Survey's Halley Station during 1989. The design of an experiment using an array of six improved instruments is briefly described. (Auth.)

I-46418
King, A.W., Emanuel, W.R., Post, W.M., **Projecting future concentrations of atmospheric CO2 with global carbon cycle models: the importance of simulating historical changes,** *Environmental management,* Jan./Feb. 1992 16(1), p.91-108, Refs. p.105-108.

Projections of future atmospheric CO2 concentrations using global carbon cycle models and assumed time series of future anthropogenic CO2 emissions are only useful if simulations agree reasonably well with the observed history of past changes in atmospheric CO2. In this article simulations from a set of eight global carbon cycle models are compared with observations of atmospheric CO2 from the Siple Station ice core and the monitoring station at Mauna Loa Observatory, HI, USA. The comparisons reinforce previous assessments that early estimates of biospheric CO2 emissions derived by reconstruction of historical land-use change are incompatible with the understanding of atmosphere-ocean CO2 exchange codified in conventional carbon cycle models and the observed history of changes in atmospheric CO2. More recent estimates of the history of CO2 emissions associated with land-use change do not significantly resolve this incompatibility. Terrestrial biospheric emissions estimated by deconvolution of atmospheric CO2 observations provide reasonable correspondence between simulation and observation, but the deconvolution estimates differ dramatically from the estimates by land-use reconstruction. Resolution of this difference is a challenge for modelers of the global terrestrial biosphere. In the interim, caution is required in interpreting atmospheric CO2 projections from models that have not yet resolved the basic inconsistencies among emission estimates, models of oceanic uptake, and observations of atmospheric CO2. (Auth. mod.)

I-46423
Egger, J., **Topographic wave modification and the angular momentum balance of the antarctic troposphere,** *Journal of the atmospheric sciences,* Feb. 15, 1992 49(4), p.327-334, 11 refs.

A shallow inversion layer with southeasterly outflow and a cyclonic vortex in the troposphere are the basic characteristics of the antarctic mean circulation. An attempt is made to model this pattern in a two-layer representation of the atmosphere where all equations are averaged horizontally over the antarctic domain. Cooling at the slope drives a direct circulation that acts as a source of westerly angular momentum. This momentum is transferred out of Antarctica by topographically modified large-scale waves, enforced at the northern boundary of the model. Two types of steady states are found for fixed frequency and zonal wavenumber: one where the wave is quite effective in performing the required momentum transport so that a qualitatively realistic circulation results, and another one with strong upper-level westerlies but virtually no surface easterlies. A model climatology can be derived if stochastic forcing is added to the equations. It turns out that the distribution of the flow states is centered near a "realistic" equilibrium if a wave spectrum is prescribed at the northern boundary according to observations. (Auth.)

I-46428
Smith, R.C., Wan, Z.M., Baker, K.S., **Ozone depletion in Antarctica: modeling its effect on solar UV irradiance under clear-sky conditions,** *Journal of geophysical research,* May 15, 1992 97(C5), p.7383-7397, Refs. p.7395-7397.

Radiative transfer numerical simulations have been made for quantitatively analyzing the effect of ozone depletion on solar irradiance at the Earth's surface in the UV and visible ranges. Simulations show that the ozone's temperature-dependent absorption and atmospheric multiple scattering play important roles in the UV region. By means of sensitivity analyses, the level of surface UV-B irradiance under clear-sky conditions is shown to depend, with a decreasing significance, on solar zenith angle, total column ozone, surface spectral reflectivity, stratospheric temperature, and aerosol variations. The simulation results are compared with the National Science Foundation (NSF)/UV spectroradiometer data obtained at Palmer Station and the Total Ozone Mapping Spectrometer (TOMS) satellite data. In general, the model and data show good agreement, especially in the UV region. Based on simulation results, a UV irradiance ratio method to estimate total column ozone from the NSF/UV spectroradiometer using clear- sky data obtained during the austral spring of 1988 and 1990 is developed. A method for estimating surface UV-B from TOMS satellite data is also developed. (Auth. mod.)

I-46430
Gaudichet, A., **Comments on the origin of dust in East Antarctica for present and ice age conditions,** *Journal of atmospheric chemistry,* Apr. 1992 14(1-4), p.129-142, 23 refs.

In this paper, the distribution of 327 clay mineral particles retrieved from four antarctic ice samples corresponding to present and Last Glacial Maximum (LGM) climate conditions were studied. Illite, chlorite, smectite and kaolinite were identified in all samples. Focusing on kaolinite, because of its use as a possible tracer of low latitude soils, a significantly smaller amount for LGM samples was found, while the dust concentration in snow during the LGM was about 30 times higher than for present climate conditions. This can be interpreted as change in the contribution of the Australian source with climate. A second approach was based on the modeling of the desert dust cycle using an Atmospheric General Circulation Model (AGCM) under both present-day and ice age conditions. Unlike mineralogical results, the model suggests the prevalence of the Australian dust source in the deposits over East Antarctica under both present-day and LGM climate conditions. However the model fails to reproduce the strong increase in dust deposits during the LGM. This discrepancy could be partly due to the lack of a higher latitude dust source in the model. The stronger dust input recorded in ice cores for the LGM could be related to an additional active high latitude source (possibly close to South America) overlapping the atmospheric background coming from low latitude areas. (Auth. mod.)

I-46431
Savoie, D.L., Prospero, J.M., Larsen, R.J., Saltzman, E.S., **Nitrogen and sulfur species in aerosols at Mawson, Antarctica, and their relationship to natural radionuclides,** *Journal of atmospheric chemistry,* Apr. 1992 14(1-4), p.181-204, Refs. p.202-204.

High volume aerosol samples were collected continuously at Mawson Station from Feb. 1987 through Oct. 1989. All samples were analyzed for Na+, Cl-, SO4=, NO3-, methanesulfonate (MSA), NH4+, Be-7, and Pb-210. The annual mean concentrations of many of the species are substantially lower than even those over the relatively pristine regions of the tropical and subtropical South Pacific. The concentrations at Mawson are comparable both in magnitude and in seasonality to those which have been measured in long term studies at the South Pole and at the coastal German antarctic research station, Georg von Neumayer. This comparability suggests that the aerosol composition may be relatively uniform over a broad sector of the Antarctic. The concentrations of most of the species exhibit very strong and sharply-defined seasonal cycles. These results indicate that the major source of NO3- over Antarctica is probably of continental as opposed to stratospheric or marine biogenic origin. (Auth. mod.)

I-46433
De Angelis, M., Barkov, N.I., Petrov, V.N., **Sources of continental dust over Antarctica during the last glacial cycle,** *Journal of atmospheric chemistry,* Apr. 1992 14(1-4), p.233-244, 18 refs.

The soluble and insoluble parts of 4 major components (Al, Ca, K and Mg) of the continental dust input over East Antarctica, as well as size distribution parameters of the insoluble part of this dust, have been studied along an ice core which spans the last climatic cycle (160 kyr). These results provide a better understanding of the respective impact of the different potential dust sources. While Al and K were probably entrapped in illite originating from arid areas and in a lesser extent from shallow marine sediments, Ca and Mg inputs were dominated by marine carbonate of exposed continental shelves emissions. (Auth.)

I-46435
Delmas, R.J., **Free tropospheric reservoir of natural sulfate,** *Journal of atmospheric chemistry,* Apr. 1992 14(1-4), p.261-271, 41 refs.

Be-10 is used as a spike of the natural background atmospheric aerosol to calculate the global flux of sulfur (Fs) into the free troposphere. The sulfate and Be-10 concentrations determined in polar snow are compared. On the basis of an annual Be-10 production rate of 1.21 10 million at./sq cm, a very low figure of 2.9 Tg S/a is calculated for Fs, which suggests that most of the sulfur emitted at ground level remains in the boundary layer. The role of carbonylsulfide in the upper tropospheric sulfur budget is reviewed. It is also shown that cataclysmic volcanic eruptions may disturb considerably for 1-2 years this vast background tropospheric sulfur reservoir. Three antarctic sites were among sources of ice cores for analysis of snow chemistry. (Auth. mod.)

I-46436
Leiterer, U., **Climatic changes and aerosol transport in the Antarctic and Arctic** [Klimaschwankungen und Aerosoltransport in der Antarktis und Arktis], *Zeitschrift für Meteorologie,* 1991 41(5), p.343-349, In German with English summary. 15 refs.

In the first part of this paper, possible reasons for climatic changes during the last 160,000 years are discussed. For the explanations of climatic changes, the information of the 2083 m ice core obtained by Soviet Antarctic Expeditions at Vostok Station is used. The investigations carried out by a French-Soviet team provide quantitative results of prior changes of the snow-surface temperature, CO2 and aerosol concentration. In the second part of the paper, peculiarities of the large scale antarctic circulation and the physical properties of the aerosol are described. Some aspects of recent climate changes in the Arctic are also discussed. (Auth. mod.)

I-46439
Bian, L., Lu, L., Jia, P., **Radiation data at Zhongshan Station, Antarctica, from Feb. 1990 to Jan. 1991,** *CHINARE data report,* Dec. 1991 No.4, 121p., In Chinese with English summary.

Radiation and micrometeorological observations, using a 32 m tower at Zhongshan Station, were carried out as part of the CHINARE-VI program from Feb. 12, 1990, to Jan. 31, 1991. The structure of the atmospheric boundary layer and the heat balance components near the surface were studied. The hourly mean values of global, reflected, net, and effective radiation, and hourly mean albedo, are presented in tables.

I-46445
Bian, L., Lu, L., Jia, P., **Observational study of radiation balance components over Larsemann Hills,** *Antarctic research (Chinese edition),* Dec. 1991 3(4), p.42-53, In Chinese with English summary. 9 refs.

A project to obtain continuous measurements of surface radiation balance components was carried out at Zhongshan Station from Feb. 1990 to Jan. 1991. A micro-computer sampling system was used, with pyranometers measuring the radiation flux, including direct solar radiation and global, reflected, and net radiation (0.3-30 microns). These values were sampled digitally and recorded every minute at 1.5 m above the surface. Results are shown in tables and are summarized as follows: the annual mean value of the global radiation is 119.2 W/sq m, about 90% of which is obtained during Oct.-Mar. The annual mean albedo is 0.42, and it varies significantly from day to day. The annual mean value of net radiation is 11.7 W/sq m. The mean value of the net radiation is positive (64.1 W/sq m) from Oct. to Mar., and negative (-40.6 W/sq m) the rest of the year. (Auth. mod.)

I-46454
Wang, G., Xiong, X., **Analysis of some characteristics of solar radiation at Zhongshan Station, Antarctica,** *Antarctic research (Chinese edition),* Sep. 1991 3(3), p.64-68, In Chinese with English summary. 3 refs.

Observations of solar radiation at Zhongshan Station were carried out during Jan.-Feb. 1990, using an automatic spectral pyranometer model TBQ-4. Measurements and some characteristics of radiation, such as the mean diurnal variations of total radiation, near infrared, visible radiation, and ultraviolet radiation in clear-sky and cloudy-sky conditions, are discussed and illustrated. (Auth. mod.)

I-46455
Wigley, T.M.L., Raper, S.C.B., **Implications for climate and sea level of revised IPCC emissions scenarios,** *Nature,* May 28, 1992 357(6376), p.293-300, 47 refs.

A new set of greenhouse gas emissions scenarios has been produced by the Intergovernmental Panel on Climate Change (IPCC). Incorporating these into models that also include the effects of CO2 fertilization, feedback from stratospheric ozone depletion and the radiative effects of sulphate aerosols yields new projections for radiative forcing of climate and for changes in global-mean temperature and sea level. Changes in temperature and sea level are predicted to be less severe than those estimated previously, but are still far beyond the limits of natural variability. Brief reference is made to both polar regions. (Auth. mod.)

I-46456
Sloan, L.C., **Possible methane-induced polar warming in the early Eocene,** *Nature,* May 28, 1992 357(6376), p.320-321, 7 refs.

Reconstructions of early Eocene climate depict a world in which the polar environments support mammals and reptiles, deciduous forests, warm oceans and rare frost conditions. At the same time, tropical sea surface temperatures are interpreted to have been the same as or slightly cooler than present values. The question of how to warm polar regions of Earth without noticeably warming the tropics remains unresolved; increased amounts of greenhouse gases would be expected to warm all latitudes equally. Oceanic heat transport has been postulated as a mechanism for heating high latitudes, but it is difficult to explain the dynamics that would achieve this. Considered here are estimates of Eocene wetland areas, and it is suggested that the flux of methane, an important greenhouse gas, may have been substantially greater during the Eocene than at present. Elevated methane concentrations would have enhanced early Eocene global warming, and also might specifically have prevented severe winter cooling of polar regions because of the potential of atmospheric methane to promote the formation of optically thick, polar stratospheric ice clouds. (Auth. mod.)

I-46458
Dickey, J.O., Marcus, S.L., Hide, R., **Global propagation of interannual fluctuations in atmospheric angular momentum,** *Nature,* June 11, 1992 357(6378), p.484-488, 18 refs.

The El Niño Southern Oscillation (ENSO), a climate fluctuation that recurs on a 2-7 yr timescale, is associated with persistent large-scale fluctuations in the dynamical behavior of the global atmosphere-ocean system. A study is presented of the latitudinal redistribution of angular momentum within the atmosphere from 1976 to 1991. This reveals a slow, global-scale, coherent, poleward propagation of atmospheric angular-momentum fluctuations on interannual timescales. These originate in equatorial regions, where they lead the main atmospheric anomalies of the ENSO cycle by nearly two years; they penetrate to latitudes higher than 60 deg in both hemispheres, where they lag behind the ENSO cycle by about 4 years. Also distinguishable is the bimodality of the ENSO phenomenon, with a low-frequency component centered at a period close to 4.2 years and a high-frequency component centered near 2.4 years. Each of the two components has a distinct latitudinal propagation pattern. In the period studied, strong El Niño and related La Niña climatic events occur when these components add constructively. (Auth. mod.)

I-46459
Leuenberger, M., Siegenthaler, U., Langway, C.C., **Carbon isotope composition of atmospheric CO2 during the last ice age from an antarctic ice core,** *Nature,* June 11, 1992 357(6378), p.488-490, 35 refs.

Bubbles of ancient air in polar ice cores have revealed that the atmospheric concentration of CO2 during the Last Glacial Maximum was 180-200 p.p.m.v., substantially lower than the pre-industrial value of about 280 p.p.m.v. It is generally thought that this reduction in atmospheric CO2 during glacial time was driven by oceanic processes. The most likely explanations invoke either a decrease in dissolved CO2 in surface waters because of a more efficient 'biological pump' transporting carbon to deep waters, or a higher alkalinity in the glacial ocean as a consequence of changes in carbonate dissolution or sedimentation. Because isotope fractionation during photosynthesis depletes C-13 in the organic matter produced, changes in the biological pump would alter the carbon isotope composition of atmospheric CO2, whereas changes in alkalinity would in themselves have no such effect. Reported here are measurements of the carbon isotope content of CO2 in ice cores from Byrd Station in an attempt to distinguish between these mechanisms. During the ice age the reduced isotope ratio *delta*C-13 was more negative than pre-industrial values by 0.3 per mill. Although this result does not allow a definite discrimination between the two possible causes of lower glacial atmospheric CO2, it does indicate that changes in the strength of the biological pump cannot alone have been responsible. (Auth. mod.)

I-46467
Ohtani, S., **Meteorological data measured at the biological hut, the Yukidori Valley, Langhovde, Antarctica, in the austral summer of 1987-1988 and 1988-1989,** *Japanese Antarctic Research Expedition. JARE data reports,* Mar. 1992 No.178, 64p., 3 refs.

Members of the Japanese Antarctic Research Expedition carried out meteorological observations in Yukidori Valley, Langhovde Hills, in Dec. 1987-Apr. 1988 and Nov. 1988- Jan. 1989. Data on wind direction and speed, air temperature, and relative humidity are presented in tables.

I-46494
Bannikov, V.I., Galkin, S.I., Tarabukin, I.A., **Radiophysical investigations of the characteristics of cloudy atmosphere in Antarctica** [Radiofizicheskoe issledovanie kharakteristik oblachnoĭ atmosfery v usloviiakh Antarktidy], *Leningrad [Sankt-Peterburg]. Glavnaia geofizicheskaia observatoriia. Trudy,* 1991 Vol.538, p.71-75, In Russian. 3 refs.

Results from combined passive-active remote sensing observations of convective cloudiness in the area of Molodezhnaya Station are presented. The presence of droplets in clouds at low temperatures, with the water content being greater than 0.05 g/cu cm, can cause aircraft icing.

I-46505
Lin, N.H., Saxena, V.K., **Characteristics of antarctic stratospheric aerosols during the 1987 ozone depletion episode based on SAGE II satellite observations,** *Journal of geophysical research,* May 20, 1992 97(D7), p.7635-7649, 69 refs.

In this study, features of antarctic stratospheric aerosols during the ozone depletion episode of Oct. 1987 are investigated based on the SAGE II (Stratospheric Aerosol and Gas Experiment II) data. The study focuses on (1) inferring the aerosol size spectrum using a modified randomized minimization search technique and (2) investigating the vertical, zonal, and columnar averages of aerosol properties such as extinction coefficient, optical depth, mean and effective radii, mass loading, total number concentration, and surface area concentration, together with the ozone concentration. On the average, in the region below 18 km, maximum values for the parameters of mass loading, total number, and surface area concentration were found to be located just above the region of the most severe ozone depletion. As to the columnar aerosol properties, a bimodal feature in the size distribution is found during the days when the peak values of optical depth are greater than .001. Relatively abundant population of smaller particles is associated with the region of severe ozone depletion. The distinct latitudinal gradients of these aerosol parameters suggest that the stratospheric aerosols are separated into two regimes near 62-63S, probably as a result of the dynamics introduced by polar vortex. Smaller and larger particles dominate at higher and lower latitudes, respectively. The average amount is about 95 DU (Dobson units) with the amplification of about 48 DU. It is pointed out that the reported features of the stratospheric aerosols in the antarctic region are useful in providing insights into the mechanisms for ozone depletion. (Auth. mod.)

I-46507
Gruzdev, A.N., **Peculiarities of polar ozone annual course: analysis of satellite and ozonesonde data and model results,** *Norsk geologisk tidsskrift,* Oct. 1991 71(3), Climate of the northern latitudes: past, present and future. Edited by M. Hald, et al, p.183-187, 11 refs.

The following analysis demonstrates certain space-time structures in the annual evolution of the ozone field. Latitude-altitude features of the ozone annual cycle in different layers of the stratosphere and troposphere, in the northern and southern hemispheres (NH and SH) at middle latitudes are compared with those in polar latitudes. There are differences in principle in ozone space-time dynamics in the northern and southern polar regions, particularly in connection with stratospheric-tropospheric exchange, boundary-layer ozone, and the possible creation of ozone 'holes'. (Auth.)

I-46523
Reed, M.R., Stewart, M., **U.S. Naval Support Force, Antarctica: weather operations 1989-1990,** *Antarctic journal of the United States,* 1990 25(5), p.296-297.

The U.S. Antarctic Program's all-Navy weather staff uses a unique polar orbiting satellite system developed specifically for Operation DEEP FREEZE by the Scripps Institution of Oceanography in La Jolla, CA. Four times daily, the system (called GODDESS) relays satellite images from McMurdo to the Antarctic Research Center at Scripps for recording in the archives there. All weather observations from U.S. Antarctic Program reporting stations are forwarded to McMurdo Station. These reports are rebroadcast via high-frequency teletype to Christchurch, New Zealand, where they are inserted into the New Zealand Meteorological data circuit. From Christchurch the data is sent to Wellington, New Zealand, put into the World Meteorological Organization's data stream and made available to all potential users.

I-46545
Gallée, H., Schayes, G., **Dynamical aspects of katabatic wind evolution in the antarctic coastal zone,** *Boundary-layer meteorology,* Apr. 1992 59(1-2), p.141-161, 33 refs.

The spatial evolution of katabatic winds along idealized slopes representative of antarctic terrain is examined, using a hydrostatic, two-dimensional primitive equation model with high resolution. A downslope momentum-forces analysis is made of simulations in which katabatic flow reaches steady state, with emphasis on physical mechanisms in the coastal zone. The importance of the reversal of the pressure gradient force in the coastal zone, causing the sudden decay of katabatic winds, is discussed. (Auth.)

I-46546
Kawaguchi, S., ed, NIPR Symposium on Polar Meteorology and Glaciology, 13th, Tokyo, July 12-13, 1990, **Proceedings of the NIPR Symposium on Polar Meteorology and Glaciology, No.5,** Tokyo, National Institute of Polar Research, 1992, 194p., Refs. passim. For individual papers see F-46555, F-46556, F-46558 through F-46563, I-46547 through I-46554, I-46557, I-46564, I-46565 or 46-4405 through 46-4416.

This is a collection of papers presented at the 13th Symposium on Polar Meteorology and Glaciology held on July 12-13, 1990, in Tokyo. It consists of 19 full length papers and 15 abstracts; the former are arranged in areas of meteorology, physical oceanography and glaciology. They include studies of atmospheric constituents, ozone, sea ice and physical oceanography, atmospheric circulation and climate, ice sheet and snow cover, ice core, snow and ice crystals, meteorological and glaciological observations, remote sensing, instrumentation and polar region engineering, as part of the research programs of the Antarctic Climate Research, 1987-1991, East Queen Maud Land Glaciological Project, 1982-1986, and Middle Atmosphere Program, 1982-1985.

I-46547
Iwasaka, Y., **Chemical state of polar stratospheric aerosols,** NIPR Symposium on Polar Meteorology and Glaciology, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1992, p.1-8, 19 refs.

The possibility that particles containing nitric acid form above the background sulfate particle layer in the winter arctic stratosphere is discussed. External mixing of nitric acid and sulfate particles was observed in the region of 18.8-19.6 km (the upper part of the sulfate particle layer) during the measurements of Jan. 31, 1990. One possible explanation of this phenomenon is sedimentation of the nitric acid particles, which could be an important process causing denitrification of the polar stratosphere and polar ozone depletion. A high aerosol layer is frequently observed in early winter at Showa Station, believed to be due to formation of nitrate particles above the sulfate aerosol layer. (Auth. mod.)

I-46548
Yamazaki, K., Chiba, M., **Transport simulation of passive tracers from the Northern Hemisphere to the Southern Hemisphere,** NIPR Symposium on Polar Meteorology and Glaciology, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1992, p.9-23, 22 refs.

In order to study the transport process of anthropogenic gases such as CO2 and halocarbons, transport simulations were performed for passive tracers emitted from various regions from Dec. 1 to mid-Oct. It is found that large gradients (tracer front) formed near the equator at low levels in all the Northern Hemisphere (NH) cases. In the Southern Hemisphere (SH), tracer density increases with height in the troposphere in all cases. The above features are related to the inter-hemispheric transport. From the NH, tracers spread into the equator through the lower layer, move upward over the equator and are transported through the upper troposphere into the SH. The above results imply that transport accounts for the observed latitudinal and vertical distribution of CO2 and halocarbons, in addition to source/-sink effect. It is suggested that the tracer density in the antarctic stratosphere is extremely low, but would be expected to increase if the calculations were continued until the austral summer. (Auth. mod.)

I-46549
Iwasaki, T., **Mean-meridional circulation of the polar stratosphere reproduced in a GCM,** NIPR Symposium on Polar Meteorology and Glaciology, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1992, p.24-28, 6 refs.

The lower-stratospheric circulation of a GCM is analyzed with the new TEM scheme in the pressure-isentrope hybrid vertical coordinate. The polar stratospheric downward mass flux in winter is found to be much larger in the Northern Hemisphere than in the Southern Hemisphere. (Auth.)

I-46550
Kanzawa, H., **Proposal for observation of atmospheric circulation and transport processes in the troposphere and lower stratosphere over Antarctica with a network of wind profilers,** NIPR Symposium on Polar Meteorology and Glaciology, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1992, p.29-38, 23 refs.

A plan for installing wind profilers at several points over Antarctica is proposed. Observations with a network of the wind profilers at several sites will give useful information on meridional circulation in the troposphere and lower stratosphere, on vertical motion around the tropopause whose altitude over Antarctica is around 10 km, and on disturbances such as convection, gravity waves, baroclinic waves, etc. Observations are also useful for understanding how, when, and how much ozone, water vapor, and other materials are transported from the stratosphere to the troposphere, and thence to the antarctic surface or the middle latitude troposphere. Problems to be overcome for realizing the project are also briefly discussed. (Auth. mod.)

I-46551
Masuko, H., Ochiai, S., **Development of short-millimeter and sub-millimeter wave radiometer/spectrometer system for observing ozone and trace gases in the upper atmosphere,** NIPR Symposium on Polar Meteorology and Glaciology, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1992, p.39-55, 15 refs.

A radiometer/spectrometer system operating in the millimeter and sub-millimeter wave range is the most promising method to remotely observe upper atmospheric ozone and other trace gases, making it possible to monitor the vertical profiles of trace gases from the ground. Limb emission observation from space makes it possible to globally estimate the three-dimensional distributions of trace gases. Communications Research Laboratory (CRL) has started to develop a ground-based system operating in the short-millimeter wave range. It is also planned to develop a balloon-borne system, which is necessary for basic estimation of the satellite-borne system and its data analysis. In this report, the authors present the plan of CRL, together with the results of the feasibility study for developing these systems. (Auth. mod.)

I-46552
Aoki, S., Nakazawa, T., Murayama, S., Kawaguchi, S., **Precise measurements of atmospheric methane concentration at Syowa Station (69S, 39.6E), Antarctica,** NIPR Symposium on Polar Meteorology and Glaciology, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1992, p.56-65, 16 refs.

Precise measurements of atmospheric CH4 concentration were initiated at Showa Station in Feb. 1988. A regular diurnal variation is not observable, but irregular variations are sometimes observed with extremely small amplitude of 5 ppbv at most. A seasonal variation is clearly seen with an amplitude of 30 ppbv. Annual mean values of CH4 concentration were 1640 and 1651 ppbv for 1988 and 1989, respectively. (Auth.)

I-46553
Aoki, S., **Atmospheric carbon dioxide measurements at Syowa Station, Antarctica, 1984-1988,** NIPR Symposium on Polar Meteorology and Glaciology, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1992, p.66-75, 22 refs.

Precise and continuous measurements of atmospheric CO2 concentration have been continued at Showa Station since Feb. 1984. Diurnal CO2 variation was hardly observable throughout the year. The secular CO2 trend was variable with time, showing a slow increase in 1984, 1986 and 1988 and rapid increase in 1985 and 1987. The annual CO2 increase was notable, especially in 1987, which may be related to the 1987 ENSO event. The average rate of annual CO2 increase over the last 5 years was about 1.6 ppmv/yr. The average seasonal CO2 cycle showed minimum and maximum concentrations in mid-Apr. and in early Oct., respectively. Its peak-to-peak amplitude was about 1.1 ppmv for the period 1984-1988. The seasonal cycle was variable from year to year, but there was no indication of long-term amplitude increase. It was found that irregular CO2 variations with amplitudes of about 0.2 ppmv have high correlation with air mass exchange by synoptic scale weather disturbances. (Auth.)

I-46554
Aoki, T., Yamanouchi, T., **Cloud-radiative forcing over the snow-covered surface around Asuka Station, Antarctica,** NIPR Symposium on Polar Meteorology and Glaciology, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1992, p.76-89, 13 refs.

Cloud-radiative forcing at the snow-covered surface in Antarctica was estimated from data of the radiation budget observation at Asuka Station in 1988. Cloud-radiative forcing at the top of the atmosphere was also estimated from satellite data in Dec. 1988. It was found that shortwave forcing was negative (cooling) at the surface and positive (heating) at the top of the atmosphere. The longwave forcing was positive both at the surface and at the top of the atmosphere. The (shortwave+longwave) forcing was positive both at the surface and at the top of the atmosphere. The shortwave forcing was positive over the snow-covered region except the high inland, and negative over the seas. The longwave forcing was positive over all regions. The (shortwave+longwave) forcing was positive over the snow-covered regions except the high inland plateau, and negative over the sea. (Auth. mod.)

I-46557
Enomoto, H., Ohmura, A., **Open water and circumpolar trough in the Antarctic,** NIPR Symposium on Polar Meteorology and Glaciology, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1992, p.104-112, 28 refs.

The extent of open water area in spring and the time of rapid retreat of the sea ice area in late spring are important characteristics of sea ice in the Antarctic. The present study investigates relationships between atmospheric conditions and open water extent. In this study, the position and intensity of the circumpolar trough are used as a measure of atmospheric conditions over the sea ice. When the circumpolar trough is intense, it tends to be located at higher latitudes along the antarctic coast. In such cases, the open water in spring increases and the time of significant retreat of the sea ice edge in late spring tends to be delayed. (Auth.)

I-46564
Yamanouchi, T., Oshiyama, T., Wada, M., **Analysis of MOS-1 MSR data received at Syowa Station, Antarctica,** NIPR Symposium on Polar Meteorology and Glaciology, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1992, p.156-166, 14 refs.

Atmospheric parameters and ground surface information are obtained using the MOS-1 MSR data received at Showa Station. Several difficulties have appeared in the process of deriving water vapor amount and liquid water content. One is the antenna temperature, which includes large bias error; this causes the largest uncertainty. Also, the antenna temperature near the coast of the antarctic continent was greatly affected by high brightness temperature of the ice sheet owing to the antenna side lobe, which caused difficulties in comparing with ground- based observations as a validation. In the normal condition, for the present example, water vapor amount ranged from 0.4 to 1.4 g/sq cm and liquid water content from 0 to 14 mg/sq cm. However, there was found a band of high liquid water content in some paths, corresponding to a high brightness temperature of about 190 K. Atmospheric water vapor or liquid water affects the estimation of surface conditions such as sea ice concentration. It is difficult to obtain atmospheric parameters over the ice sheet and sea ice, on account of their high and variable brightness temperature. (Auth.)

I-46565

Seko, K., **Preliminary study of katabatic wind by using NOAA AVHRR data,** NIPR Symposium on Polar Meteorology and Glaciology, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1992, p.167-173, 14 refs.

The behavior of katabatic winds on the antarctic ice sheet can be monitored from NOAA AVHRR data. Katabatic wind is observed as fluctuations of brightness temperature on the thermal infrared channel. The structure of the fluctuation reveals a well-defined streak feature. Wind direction and wind speed can be monitored from the satellite images. The fluctuation of brightness temperature is probably caused by fluctuation in wind velocity. (Auth.)

I-46566

Geller, M.A., Nash, E.R., Wu, M.F., Rosenfield, J.E., **Residual circulations calculated from satellite data: their relations to observed temperature and ozone distributions,** *Journal of the atmospheric sciences,* July 1, 1992 49(13), p.1127-1137, 20 refs.

Monthly mean residual circulations were calculated from eight years of satellite data. The diabatic circulation is usually found to give a good approximation to the residual circulation, but this is not always the case. In particular, an example is shown at 60S and 30 mb where the diabatic and residual circulations show very different annual variations. Correlations between the vertical component of the residual circulation and temperature and ozone indicate that yearly variations of temperatures at higher latitudes are under radiative control, except during stratospheric warmings. A one to two month phase lag is seen in the annual variation in the total ozone at 60N with respect to the maximum downward residual motions. This phase lag is greater at 60N than at 60S. There is evidence at 60S of a greater downward trend in the mean zonal ozone maxima than there is in the minima. A decreasing trend in the maximum descending motion is seen to accompany the ozone trend at 60S. (Auth. mod.)

I-46567

Rees, J.M., **On the characteristics of eddies in the stable atmospheric boundary layer,** *Boundary-layer meteorology,* June 1991 55(4), p.325-343, 24 refs.

A discussion of the cross-spectral properties of eddies in the lowest 40 m of the nocturnal boundary layer is presented. The study involves the analysis of meteorological data collected at Halley Station during the austral winter of 1986. Cross-spectral analysis is used to determine whether the nature of the observed eddies is primarily turbulent or whether their structure is characteristic of coherent internal gravity waves. It is found that the cross-spectral phases indicate the presence of turbulent eddies only when the local gradient Richardson number (Ri) is less than the critical value of 1/4. Trapped modes were only observed when an offshore wind prevailed, indicating that topographic effects are responsible for their generation. The relative phases of velocity and temperature were often observed to change with height. This can be explained by examining the underlying meteorological conditions. On several occasions, regions of counter-gradient fluxes were detected. A physical explanation of this phenomenon is proposed. (Auth.)

I-46581

Koster, R.D., Jouzel, J., Suozzo, R.J., Russell, G.L., **Origin of July antarctic precipitation and its influence on deuterium content: a GCM analysis,** *Climate dynamics,* June 1992 7(4), p.195-203, 27 refs.

The NASA/GISS GCM (general circulation model) is used to estimate the evaporative contributions of several oceanic regions (defined by temperature) to Antarctica's July precipitation. Tracer diagnostics in the GCM suggest that the weighted average evaporative source temperature for antarctic precipitation as a whole is about 12 C. The average source temperature for local precipitation there varies from 9 C to 14 C. To examine the effect of evaporative source on water isotope concentration, the GCM also follows a global deuterium (HDO) tracer and deuterium tracers evaporating from each oceanic region. The results suggest that although evaporative source temperature does affect the concentrations of the individual HDO tracers, differences in evaporative source do not explain the scatter in the roughly linear relationship between condensation temperature and isotope concentration. (Auth. mod.)

I-46582

Huang, J., Bowman, K.P., **Small ice cap instability in seasonal energy balance models,** *Climate dynamics,* June 1992 7(4), p.205-215, 16 refs.

Results from a two-dimensional energy balance model with a realistic land-ocean distribution show that a small ice cap instability exists in the Southern Hemisphere, but not in the Northern Hemisphere. A series of experiments using a one-dimensional energy balance model with idealized geography are used to study the roles of the seasonal cycle and the land-ocean distribution. The results indicate that the seasonal cycle and land-ocean distribution can influence the strength of the albedo feedback, which is responsible for the small ice cap instability, through two factors: the temperature gradient and the amplitude of the seasonal cycle. The land-ocean distribution in the Southern Hemisphere favors the small ice cap instability, while the land-ocean distribution in the Northern Hemisphere does not. Because of the longitudinal variations of land-ocean distribution in the Northern Hemisphere, the behavior of ice lines in the Northern Hemisphere cannot be simulated and explained by a model with zonally symmetric land-ocean distribution. Model results suggest that the small ice cap instability may be a possible mechanism for the formation of the antarctic icesheet. The model results cast doubt, however, on the role of small ice cap instability in Northern Hemisphere glaciations. (Auth.)

I-46587

Kawahira, K., Hirooka, T., **Variations of mean zonal winds relating to the ozone hole,** *Journal of geophysical research,* June 20, 1992 97(D9), p.10,157-10,163, 17 refs.

Dynamical effects on the development of the antarctic ozone hole have been investigated through the analysis of the interannual variations of the monthly mean zonal winds in the Southern Hemisphere (SH) stratosphere using the National Meteorological Center analyzed geopotential height data, below and above 50 mbar, and the United Kingdom Meteorological Observatory analyzed temperature data, from which geopotential heights are calculated. It is found that the year-to-year changes of the mean zonal winds in the SH winter and spring in the lower stratosphere have shown no clear trends during the period 1980-1988, in contrast to the ozone depletion and temperature decline. There are apparent differences in the zonal wind comparison between the 1980s and the early 1970s which are cited from the new CIRA model compiled by Barnett and Corney (1985). This seems to indicate that the dynamical condition appropriate for the development of the ozone hole, less poleward transport of heat and ozone by planetary waves, had been already present during the appearance of the ozone hole in about 1980, and is still continuing. (Auth. mod.)

I-46588

Austin, J., Butchart, N., **Three-dimensional modeling study of the influence of planetary wave dynamics on polar ozone photochemistry,** *Journal of geophysical research,* June 20, 1992 97(D9), p.10,165-10,186, Refs. p.10,184-10,186.

The influence of planetary wave dynamics on polar ozone photochemistry is examined, using a three-dimensional model of the stratosphere and lower mesosphere. The model contains a comprehensive range of photochemical reactions and includes heterogeneous reactions and polar ozone chemistry. The model is forced at its lower boundary (316 mbar) with a specified wavenumber one geopotential height field. Idealized experiments are performed using the same zonally symmetric initial conditions but with different wave amplitudes at the lower boundary. The wave amplitudes are chosen to cover the range from a zonally symmetric integration, through typical Southern Hemisphere wave amplitudes to typical Northern Hemisphere springtime amplitudes. In each experiment the model is integrated for 100 days, covering the winter and springtime period during which the antarctic ozone hole is observed to develop and partially recover. The modeled ozone amounts over the polar region in these experiments show a considerable sensitivity to the planetary wave forcing. Results are broadly consistent with the known phenomenology of polar ozone chemistry in both Northern and Southern Hemispheres. An analysis of the mechanisms through which planetary wave amplitudes influence polar ozone chemistry in these experiments is presented. In particular, wave-induced mean descent over the whole polar region is identified as an important ingredient for determining the different behavior of polar ozone in the experiments. (Auth. mod.)

I-46590

Herber, A., Wendisch, M., Leiterer, U., Notholt, J., **Measurements of the optical depth and retrieval of aerosol parameters in the polar regions,** *Journal of aerosol science,* 1991 22(Suppl.1), European Aerosol Conference, 19th, Karlsruhe, Germany, Sep. 16-20, 1991. Proceedings, p.S415-S418, 9 refs.

Measurements of the direct sunlight in the UV/VIS have been performed in the Arctic, Antarctica and Germany to obtain the aerosol optical depth. The aerosol optical depth has been inverted in two ways to get the aerosol size distribution. The results show that in the Arctic due to the continental influence the values for the aerosol optical depth and for the number and size of aerosols are much higher than in the Antarctic. In both regions aerosol fluctuations and bimodal distributions can be observed. (Auth.)

I-46591

Lehmann, E., Jaenicke, R., **Condensation nuclei measurements at the Georg von Neumayer Station (F.R.G.), coastal Antarctica,** *Journal of aerosol science,* 1991 22(Suppl.1), European Aerosol Conference, 19th, Karlsruhe, Germany, Sep. 16-20, 1991. Proceedings, p.S589-S592, 9 refs.

The analysis of nearly continuous records of surface-based atmospheric condensation nuclei concentration (CNC) since 1984 up to the present at the Georg von Neumayer Station shows clearly an annual cycle of CNC with low values in winter time, and a significantly increasing frequency of CNC of more than 1,000 particles per cu cm over the years. (Auth. mod.)

I-46593

Konishi, H., **Antarctic climate research data. Part 5: PPI radar data at Syowa Station, Antarctica, from Feb. to Dec. 1989,** *Japanese Antarctic Research Expedition. JARE data reports,* Mar. 1992 No.173, 60p., 3 refs.

A 5-year program of Antarctic Climate Research has been carried out at Showa, Asuka and Mizuho stations, and the surrounding ice sheet and sea ice area from 1987 to 1991 by the Japanese Antarctic Research Expedition. The main research subjects are: interannual variation of the antarctic atmosphere; sea ice-atmosphere interaction; variation of the ice sheet and the ice shelf; and ice core analysis. In JARE-29 and -30, the 2nd and 3rd year of this program, the items mainly observed were related to the interannual variation of the antarctic atmosphere. Data of precipitation clouds, obtained using a PPI (Plan Position Indicator) radar in 1989, are shown in this report. Instrumentation used in the observational program and data processing are discussed. The data in the various tables, figures and graphs are explained.

I-46594

Iwasaki, A., Yamanouchi, T., **Meteorological data at Asuka Station, Antarctica in 1990,** *Japanese Antarctic Research Expedition. JARE data reports,* Mar. 1992 No.179, 110p., 2 refs.

This report contains the surface synoptic data obtained by JARE-31 in 1990. The automatic meteorological observation system was installed at Asuka Station in Jan. 1987; an illustration is presented of the system in the form of a block diagram. Tables show the following: sensor specifications; monthly and daily meteorological data summaries; surface synoptic data; and hourly global solar radiation, from Jan. through Dec. 1990.

I-46595

Yamanouchi, T., comp., Seko, K., comp., **Antarctica from NOAA satellites. Clouds, ice and snow,** Tokyo, National Institute of Polar Research, 1992, 91p., In Japanese and English. 19 refs.

This book is organized into 4 chapters: Ch.1 is an introduction, explaining the Antarctic Climate Research (ACR) plan and the role of NOAA satellite observations and data in it, and giving an overview of the satellite observations; Ch.2 discusses clouds, a subject on which a great deal is expected from meteorological satellite observations; Ch.3 shows the sea ice around Antarctica, which responds to climatic variations in a relatively short time and in turn is thought to cause climatic variations; Ch.4 shows the antarctic ice sheet and the interaction between its surface condition and atmospheric phenomena, such as katabatic winds. The enclosed NOAA satellite AVHRR images of an area in East Antarctica, which are received at Showa Station, cover the 4-year period, starting in 1987, of the ACR Project.

I-46618

Kirchhoff, V.W.J.H., Da Silva, I.M.O., **Ozone measurements on Antarctic Peninsula** [Medidas de ozônio na península Antárticaȷ, Ciências atmosféricas e espaciais na Antártica. Anais do I Seminário Sobre Ciências Atmosféricas e Espaciais do Programa Antártico Brasileiro. (Atmospheric and space sciences in Antarctica. First Seminar on Atmospheric and Space Sciences of the Brazilian Antarctic Program, São José dos Campos, Apr. 27-29, 1988. Proceedings.) Edited by E.B. Pereira and V.W.J.H. Kirchhoff, Brazil, Instituto de Pesquisas Espaciais, 1989, p.63-80, In Portuguese with English summary. 11 refs.

Ozone measurements were taken over a 4 month period at the Comandante Ferraz Station, during two summer seasons: Feb.-Mar. of 1984-85, and Dec.-Jan. of 1987-88. Ozone was detected by UV absorption. During the observation period the concentration was quite stable at 1.5 m above ground level, in comparison to other Brazilian ecosystems, with an average of 15 ppbv (parts per billion by volume). No diurnal variation was observed. During the second experiment, CO and H2 were also measured using gas chromatography. Among the CO samples, the antarctic concentration values were the lowest, at 40 ppbv. It appears that these parameters have not yet been affected by the O3 destruction in the stratosphere. (Auth. mod.)

I-46619

Kirchhoff, V.W.J.H., **Antarctic ozone hole: recent results** [O buraco de ozônio da Antártica: resultados recentes], Ciências atmosféricas e espaciais na Antártica. Anais do I Seminário Sobre Ciências Atmosféricas e Espaciais do Programa Antártico Brasileiro. (Atmospheric and space sciences in Antarctica. First Seminar on Atmospheric and Space Sciences of the Brazilian Antarctic Program, São José dos Campos, Apr. 27-29, 1988. Proceedings.) Edited by E.B. Pereira and V.W.J.H. Kirchhoff, Brazil, Instituto de Pesquisas Espaciais, 1989, p.81-99, In Portuguese with English summary. 11 refs.

Recent measurements indicate that ozone destruction in the antarctic stratosphere is due to chemical reactions of ozone and chlorine. The latter is added to the atmosphere by anthropogenic means, being part of artificial molecules that are very stable in the troposphere: the CFCs. The status of very stable is changed in the stratosphere to very unstable by UV radiation, which frees the chlorine atom by photolysis. This starts the ozone destruction process. Ozonesonde data show that the ozone total content decreased from 300 DU (Dobson Units) to 175 DU between Aug. 15 and Sep. 15, 1987, near Comandante Ferraz Station. (Auth. mod.)

I-46620

Pereira, E.B., **Radon as a natural atmospheric tracer on the Antarctic Peninsula** [O radônio na península Antártica como traçador natural da atmosfera], Ciências atmosféricas e espaciais na Antártica. Anais do I Seminário Sobre Ciências Atmosféricas e Espaciais do Programa Antártico Brasileiro. (Atmospheric and space sciences in Antarctica. First Seminar on Atmospheric and Space Sciences of the Brazilian Antarctic Program, São José dos Campos, Apr. 27-29, 1988. Proceedings.) Edited by E.B. Pereira and V.W.J.H. Kirchhoff, Brazil, Instituto de Pesquisas Espaciais, 1989, p.100-116, In Portuguese with English summary. 12 refs.

Atmospheric radon-222 was continuously measured during 1986 at the Comandante Ferraz Station. A concentration of 2.6 +/- 0.018 Bq/cu m on the average was found, but occasional peaks of 0.126 Bq/cu m were also present. Data showed a periodicity of 25 days and a strong association with short period temperature increases. This preliminary interpretation of the data indicates a continental influence of air masses from the southern extreme of the South American continent. (Auth.)

I-46621

Artaxo, P., Andrade, F., Setzer, A.W., **Elementary composition and sources of aerosols in the atmosphere** [A composição elementar e as fontes de aerossóis na atmosfera], Ciências atmosféricas e espaciais na Antártica. Anais do I Seminário Sobre Ciências Atmosféricas e Espaciais do Programa Antártico Brasileiro. (Atmospheric and space sciences in Antarctica. First Seminar on Atmospheric and Space Sciences of the Brazilian Antarctic Program, São José dos Campos, Apr. 27-29, 1988. Proceedings.) Edited by E.B. Pereira and V.W.J.H. Kirchhoff, Brazil, Instituto de Pesquisas Espaciais, 1989, p.117-129, In Portuguese with English summary. 3 refs.

This work reports a composition study of aerosols sampled since 1985 at the Comandante Ferraz Station. A nuclear method for total analysis like PIXE, as well as the X-ray electron micropulse method for individual particle analysis, have been employed. Very low aerosol concentrations are found; 85% of the aerosol is of marine composition, but soil and sulphur compounds are also present in the fine particulate. (Auth.)

I-46622

Godoy, J.M., Reis, V.R.G., Récio, J.C., **Radioactive precipitation levels on King George I.** [Níveis de precipitação radioativa na ilha Rei George], Ciências atmosféricas e espaciais na Antártica. Anais do I Seminário Sobre Ciências Atmosféricas e Espaciais do Programa Antártico Brasileiro. (Atmospheric and space sciences in Antarctica. First Seminar on Atmospheric and Space Sciences of the Brazilian Antarctic Program, São José dos Campos, Apr. 27-29, 1988. Proceedings.) Edited by E.B. Pereira and V.W.J.H. Kirchhoff, Brazil, Instituto de Pesquisas Espaciais, 1989, p.130-137, In Portuguese with English summary. 2 refs.

Due to atmospheric nuclear tests from 1940 to 1980, different radioactive elements of long half-life (Sr-90, Cs-137) were introduced into the atmosphere. Year by year, these radionuclides precipitate on the earth's surface as radioactive fallout. The biosphere in particular is a good radioactive fallout accumulator and it is the basic medium used in this work. During 1986, samples of moss were collected and analyzed on King George I., as well as additional samples of ice, snow, sea water and sediments. The results confirm small levels of radioactivity in all of the studied materials with the exception of mosses, which showed higher concentrations. Experimental results obtained with these samples are presented and a proposal for future work on this project is discussed. (Auth.)

I-46623

Satyamurty, P., Rao, V.B., Yamasaki, Y., **Characteristics and physical processes affecting antarctic climate** [Características e processos físicos que afetam o clima da Antártica], Ciências atmosféricas e espaciais na Antártica. Anais do I Seminário Sobre Ciências Atmosféricas e Espaciais do Programa Antártico Brasileiro. (Atmospheric and space sciences in Antarctica. First Seminar on Atmospheric and Space Sciences of the Brazilian Antarctic Program, São José dos Campos, Apr. 27-29, 1988. Proceedings.) Edited by E.B. Pereira and V.W.J.H. Kirchhoff, Brazil, Instituto de Pesquisas Espaciais, 1989, p.139-161, In Portuguese with English summary. 24 refs.

Observed characteristics of the climate of Antarctica are briefly reviewed. Several physical processes which affect the climate of Antarctica are discussed. Also given is a critical discussion of the results of climatic simulation. The deficiencies of the general circulation models in simulating the observed climate are mentioned. (Auth.)

I-46624
Villela, R.J., **Cold inertial jet from the Antarctic Peninsula, a new meteorological discovery** [O jato frio inercial da península Antártica, uma nova descoberta da meteorologia], Ciências atmosféricas e espaciais na Antártica. Anais do I Seminário Sobre Ciências Atmosféricas e Espaciais do Programa Antártico Brasileiro. (Atmospheric and space sciences in Antarctica. First Seminar on Atmospheric and Space Sciences of the Brazilian Antarctic Program, São José dos Campos, Apr. 27-29, 1988. Proceedings.) Edited by E.B. Pereira and V.W.J.H. Kirchhoff, Brazil, Instituto de Pesquisas Espaciais, 1989, p.162-174, In Portuguese with English summary. 14 refs.

Based on observations and synoptic analyses made aboard R/V *Prof. W. Besnard* during five cruises of the Brazilian Antarctic Program, the characteristics are described of a recently found atmospheric circulation system that occurs in the northern Antarctic Peninsula region, consisting of a barrier wind and a low-level cold inertial jet. (Auth.)

I-46625
Bevilaqua, R.M., **Interaction between antarctic ice extension and Brazilian climate** [Interação entre a extensão do gelo antártico e o clima brasileiro], Ciências atmosféricas e espaciais na Antártica. Anais do I Seminário Sobre Ciências Atmosféricas e Espaciais do Programa Antártico Brasileiro. (Atmospheric and space sciences in Antarctica. First Seminar on Atmospheric and Space Sciences of the Brazilian Antarctic Program, São José dos Campos, Apr. 27-29, 1988. Proceedings.) Edited by E.B. Pereira and V.W.J.H. Kirchhoff, Brazil, Instituto de Pesquisas Espaciais, 1989, p.175-192, In Portuguese with English summary. 9 refs.

The extension of the antarctic ice is analyzed and possible implications, especially those that would affect weather and climate, are discussed. Speculations are made about the viability of climatic anomaly forecasting. (Auth.)

I-46626
Moreira-Nordemann, L.M., Forti, M.C., Setzer, A.W., **Chemical composition of rain water at Comandante Ferraz Station** [Composição química das águas de chuva na estação Comandante Ferraz—Antarctica], Ciências atmosféricas e espaciais na Antártica. Anais do I Seminário Sobre Ciências Atmosféricas e Espaciais do Programa Antártico Brasileiro. Atmospheric and space sciences in Antarctica. First Seminar on Atmospheric and Space Sciences of the Brazilian Antarctic Program, São José dos Campos, Apr. 27-29, 1988. Proceedings.) Edited by E.B. Pereira and V.W.J.H. Kirchhoff, Brazil, Instituto de Pesquisas Espaciais, 1989, p.193-213, In Portuguese with English summary. 24 refs.

Chemical analyses of rain water samples collected at Comandante Ferraz Station during 1985, 1986 and 1987 summers were carried out and pH values were measured. The results show a large range variation of ion contents, and strong marine influence in the chemical composition of the rain. Meteorological conditions during precipitation events also influence that composition. NO concentrations exhibit an anomalous behavior, and do not correlate with SO variations. It is noted that rain water on Antarctic Peninsula is slightly acid.

I-46627
Stevenson, M.R., De Carvalho, P.R., **Meteorological measurements made using Brazilian drifting buoys: technical aspects and first results,** Ciências atmosféricas e espaciais na Antártica. Anais do I Seminário Sobre Ciências Atmosféricas e Espaciais do Programa Antártico Brasileiro. (Atmospheric and space sciences in Antarctica. First Seminar on Atmospheric and Space Sciences of the Brazilian Antarctic Program, São José dos Campos, Apr. 27-29, 1988. Proceedings.) Edited by E.B. Pereira and V.W.J.H. Kirchhoff, Brazil, Instituto de Pesquisas Espaciais, 1989, p.215-230, 7 refs.

Progress in the technical development and use of meteorological sensors fixed to a Brazilian drifting oceanographic buoy is reported. Research with thermistors to measure both air and water temperatures from buoys showed promise with regard to simplicity in their applications and the associated costs. These sensors were designed, tested and used in Antarctica in Mar. 1985 and after being redesigned, used again during Jan.-Apr. of 1987. A significant advancement was made during 1987 with the construction of a compact tower to support meteorological sensors 2 m above the water line of the buoy. This instrumented buoy was used in the Polar Front of the Antarctic Circumpolar Current, in the Drake Passage during Dec. 1987. The buoy's sensors included two each for air and water temperature, an anemometer for wind speed and direction, and an electronic compass within the buoy to compensate for the effects of buoy rotation on wind direction. Problems related to the development and use of these drifting buoys and their data are discussed and future expectations are noted. (Auth.)

I-46633
Cariolle, D., Amodei, M., Simon, P., **Dynamics and the ozone distribution in the winter stratosphere: modelling the inter-hemispheric differences,** *Journal of atmospheric and terrestrial physics,* May 1992 54(5), p.627-640, 20 refs.

Model results of ozone distribution in both hemispheres are discussed. The model extends from ground to mesospheric levels with a spectral horizontal resolution up to isotropic wavenumber 42. It incorporates a fully interactive scheme for the ozone mixing ratio which accounts for photochemical sources and sinks, advection by the model winds and coupling with radiative calculations. The model reproduces the large scale inter-hemispheric differences quite well, with a very stable and cold vortex in the Southern Hemisphere and a warmer vortex, often distorted, in the Northern Hemisphere. It is concluded that due to interactions among dynamics, polar stratospheric cloud formation and chemistry, there is a possibility that some stratospheric ozone depletion could occur in late winter near the night terminator in the Northern Hemisphere, whereas significant ozone depletion only occurs in early spring in the Southern Hemisphere. The importance of synoptic scale dynamics on the ozone transport between the high latitudes and the equator is also stressed. The model develops tongues of ozone-rich air from the high latitudes which are irreversibly mixed at mid-latitudes with tongues of ozone-poor air from the low latitudes. Similar tongues or filaments are clearly visible in the TOMS satellite data. (Auth. mod.)

I-46636
Reifenhäuser, W., Heumann, K.G., **Bromo- and bromochloromethanes in the antarctic atmosphere and the south polar sea,** *Chemosphere,* May 1992 24(9), p.1293-1300, 15 refs.

The brominated methanes CHBr3, CH2Br2, CHBr2Cl and CHBrCl2 were determined in air and seawater samples near the Antarctic Peninsula. CHBr3 was the dominant compound with average concentrations of 6.3 pptv in the marine atmosphere and 6.2 ng/l in surface seawater. (Auth.)

I-46644

Johnson, B.J., Deshler, T., Thompson, R.A., **Vertical profiles of ozone at McMurdo Station, Antarctica; Spring 1991,** *Geophysical research letters,* June 2, 1992 19(11), p.1105-1108, 5 refs.

Forty-three vertical profiles of ozone and temperature were measured at McMurdo Station from Aug. 23-Nov. 1, 1991. The data showed severe ozone depletion during the springtime, for the third consecutive year. The lowest total column ozone, 146 DU on Oct. 10, was equal to the minimum measured in 1990, while the 18 km ozone mixing ratio on this day was 0.1 ppmv, a factor of 2 below the previous minimum observed at this altitude. Most of the ozone depletion was once again confined to the 12-20 km layer, where an 83% reduction (105 DU to 18 DU) was observed, although there were also signs of depletion occurring in the 24-30 km region and below 12 km. Intrusions of ozone-rich air above 20 km caused substantial increases in total ozone during two periods when McMurdo was near or within the polar vortex wall. (Auth.)

I-46662

Saxena, V.K., **Climate forcing due to non-sea-salt sulfates,** *IAHS publication,* 1991 No.208, Glaciers-ocean-atmosphere interactions. Edited by V.M. Kotliakov, A. Ushakov, and A. Glazovskiĭ, p.243-255, 33 refs.

The current state of the concept on ocean-derived cloud condensation nuclei (CCN) is reviewed. Salient maritime CCN sample measurements have been made in recent years and examples of CCN activation spectrum over the World Ocean are presented with an analysis of current evidence regarding the role of CCN in regulating the temperature of the earth-troposphere system. The possible impact of increased oceanic emission of dimethylsulfate (DMS) on greenhouse warming is analyzed. Further investigations of biogenic CCN are directly needed in order to advance the understanding of biosphere-geosphere interactions. Recent data from Vostok ice cores are in agreement with the idea of influence of DMS emissions on climate changes. (Auth.)

I-46680

Lubin, D., **Contribution toward understanding the biospherical significance of antarctic ozone depletion,** *Journal of geophysical research,* May 30, 1992 97(D8), p.7817-7828, 42 refs.

Measurements of biologically active UV radiation made by the National Science Foundation (NSF) scanning spectroradiometer (UV-monitor) at Palmer Station during the austral springs of 1988, 1989, and 1990 are presented and compared. Column ozone abundance above Palmer Station is computed from these measurements using a multiple wavelength algorithm. Two contrasting action spectra (biological weighting functions) are used to estimate the biologically relevant dose from the spectral measurements: a standard weighting function for damage to DNA, and a new action spectrum representing the potential for photosynthesis inhibition in antarctic phytoplankton. The severe ozone holes of 1989 and 1990, in which the ozone abundance regularly fell below 200 DU (Dobson units), brought about increases in UV surface irradiance weighted by either action spectrum. Ozone abundances and dose-weighted irradiances provided by the NSF UV-monitor are used to derive the radiation amplification factors (RAFs) for both DNA-effective irradiance and phytoplankton-effective irradiance. The RAF for DNA-effective irradiance is nonlinear in ozone abundance and is in excess of the popular "two for one" rule, while the RAF for phytoplankton-effective irradiance approximately follows a "one for one" rule. (Auth. mod.)

I-46681

Rosenfield, J.E., **Radiative effects of polar stratospheric clouds during the Airborne Antarctic Ozone Experiment and the Airborne Arctic Stratospheric Expedition,** *Journal of geophysical research,* May 30, 1992 97(D8), p.7841-7858, 53 refs.

Daily, three dimensional fields of both Type I nitric acid trihydrate (NAT) and Type II water ice polar stratospheric clouds (PSCs) have been generated in the polar regions during the period of the Airborne Antarctic Ozone Experiment (AAOE) and the Airborne Arctic Stratospheric Expedition (AASE) aircraft missions. Mission data on particulate composition and size, together with National Meteorological Center (NMC) analyzed temperatures, have been used. Mie theory and a radiative transfer model were used to compute the radiative heating rates during the mission periods, for clear and cloudy lower sky cases. Only the Type II water ice clouds have a significant radiative effect, with the Type I NAT PSCs generating a net heating or cooling of 0.1 K/d or less. The major effect of PSCs during AAOE appears to be one of net heating, with maximum heating rates as large as 0.5 K/d for particular days. Heating rates of 0.3 K/d or greater were computed during the periods of Sep. 1-6 and Sep. 11-14. This additional heating was generally found over the western part of Antarctica and near the coastal regions, while a small cooling was computed over the Antarctic Plateau. On the whole, the radiative effects of PSCs appear to be too small to have an appreciable impact on vertical motions except over time scales of a few days during AAOE. This result makes it unlikely that the radiative-dynamical mechanisms proposed for the antarctic ozone depletion play any significant role. (Auth. mod.)

I-46682

Schoeberl, M.R., Lait, L.R., Newman, P.A., Rosenfield, J.E., **Structure of the polar vortex,** *Journal of geophysical research,* May 30, 1992 97(D8), p.7859-7882, 69 refs.

Reconstruction of the Airborne Antarctic Ozone Experiment and Airborne Arctic Stratosphere Expedition aircraft constituent observations, radiative heating rate computations, and trajectory calculations are used to generate comparative pictures of the 1987 Southern Hemisphere (SH) late winter and 1989 Northern Hemisphere (NH) midwinter lower stratospheric polar vortices. Overall, both polar vortices define a region of highly isolated air, where the exchange of trace gases occurs principally at the vortex edge through erosional wave activity. Aircraft measurement showed that (1) between 50 and 100 mbar, horizontally stratified long-lived tracers such as N2O are displaced downward 2-3 km on the cyclonic (poleward) side of the jet, with the meridional tracer gradient sharpest at the jet core. (2) Eddy mixing rates, computed using parcel ensemble statistics, are an order of magnitude or more lower on the cyclonic side of the jet compared to those on the anticyclonic side. (3) Poleward zonal mean meridional flow on the anticyclonic side of the jet terminates in a descent zone at the jet core. Despite the similarities between the SH and NH winter vortices, there are important differences. During the aircraft campaign periods, the SH vortex jet core was located roughly 8-10 deg equatorward of its NH counterpart after pole centering. As a result of the larger size of the SH vortex, the dynamical heating associated with the jet core descent zone is displaced further from the pole. The SH polar vortex can therefore approach radiative equilibrium temperatures over a comparatively larger area than the NH vortex. The subsequent widespread formation of polar stratospheric clouds within the much colder SH vortex core gives rise to the interhemispheric differences in the reconstructed H2O, NOy, ClO, and O3 species which are affected by polar stratospheric clouds. (Auth. mod.)

I-46683

Kawa, S.R., **Photochemical partitioning of the reactive nitrogen and chlorine reservoirs in the high-latitude stratosphere,** *Journal of geophysical research,* May 30, 1992 97(D8), p.7905-7923, Refs. p.7921-7923.

Partitioning of the major components of the reactive nitrogen and inorganic chlorine reservoirs is derived from aircraft measurements in the lower stratosphere during the winter season in both hemispheres at latitudes of about 60-80 deg. The goal of this work is to exercise the power of the correlated set of measurements from polar missions of the NASA ER-2 aerial surveys to amplify the individual measurements. The results provide a consistent method for comparing distributions, and hence the controlling processes, between different areas of the near-polar regions. The analysis provides clear evidence of the effects of heterogeneous processes in the atmosphere. The resulting latitude distributions in the Arctic outside the vortex agree reasonably well with predictions of a two-dimensional photochemical model, indicating that partitioning in this region is largely controlled by standard homogeneous gas phase chemistry. The partitioning in the Antarctic suggests that nearly the entire range of latitudes sampled by the ER-2 is affected by heterogeneous processes *in situ,* including that portion of the "collar" region equatorward of the nominal chemically perturbed region (CPR). Consideration of heterogeneous processing in the region outside the CPR is important in predicting the possible expansion of antarctic ozone depletion and the transport of chemically perturbed air to lower latitudes. (Auth. mod.)

I-46684

Solomon, S., Keys, J.G., **Seasonal variations in antarctic NOx chemistry,** *Journal of geophysical research,* May 30, 1992 97(D8), p.7971-7978, 43 refs.

Measurements of NO2 from two sites in the Antarctic are compared with model calculations that include a detailed treatment of diurnal NOx chemistry for fall, winter, and spring. Observed slant column amounts in spring provide strong evidence for important heterogeneous effects, probably through polar stratospheric cloud chemistry. It is shown that the slow growth of NO2 column observed during September is consistent with release of NO2 from N2O5 formed above the altitudes where polar stratospheric clouds occur. The observed early fall column amounts are in good agreement with model calculations, and the sharp onset of diurnal variation in column NO2 obtained near day 57 is well simulated. Following this period, gas-phase model calculations suggest that N2O5 will rapidly accumulate during the antarctic fall as nights become longer. It is suggested that the high-latitude fall period during which N2O5 grows rapidly represents an optimum time to search for evidence of possible heterogeneous chemistry on background aerosols. (Auth. mod.)

I-46685

Pitari, G., Visconti, G., Verdecchia, M., **Global ozone depletion and the antarctic ozone hole,** *Journal of geophysical research,* May 30, 1992 97(D8), p.8075-8082, 27 refs.

The secular trend of the antarctic ozone hole has been studied with a two-dimensional model which can simulate formation of polar stratospheric clouds and includes heterogeneous chemical reactions. Results from the numerical simulation have been validated by comparison with available experimental data. Trends up to the year 2010 using standard (i.e., homogeneous) and heterogeneous chemistry have been compared, and show that global ozone depletion reached 5-6% in the last 30 years and will average 8% for the next 20 years. Subtracting a 2% loss due to standard chemistry in the presence of trace gas increase in the last 30 years, the authors find a 3-4% global ozone loss due to heterogeneous chemistry. The depletion is evident even outside the Southern Hemisphere spring season and at mid-latitudes, pointing to an increase in global ozone sink. (Auth. mod.)

I-46686

Madronich, S., Granier, C., **Impact of recent total ozone changes on tropospheric ozone photodissociation, hydroxyl radicals, and methane trends,** *Geophysical research letters,* Mar. 3, 1992 19(5), p.465-467, 23 refs.

Trends in total atmospheric ozone from 1979-1989 were analyzed to derive the corresponding changes in the tropospheric photodissociation rate coefficient *J*1 for the reaction O3+hv *(lambda*<330 nm) reaction O2+O(1D). Zonally and annually integrated trends in *J*1 are +3.8% per decade in the Northern Hemisphere and 4.1% per decade in the Southern Hemisphere. Changes in [OH] due to the *J*1 trends may have contributed to the slowing of atmospheric methane increases observed in recent years. (Auth.)

I-46711

Yang, X.Q., Huang, S.S., **Numerical experiment of climatic effect of antarctic sea ice during the Northern Hemisphere summer,** *Chinese journal of atmospheric sciences,* 1992 16(1), p.80-89, 15 refs.

In this paper, the short-term climatic effect induced by the removal of antarctic sea ice is studied by using a perpetual July general circulation model. The results show that the removal of antarctic sea ice appears to weaken the polar vortex through heating the atmosphere near the local region, and then to induce the ultra-long wave anomaly associated with amplifying the amplitude of the zonal wavenumber 3 at the middle and high latitudes of the Southern Hemisphere. Anomalies of the southern hemispheric circulation intensify the East Asian monsoon and rainfall, which excite a wavetrain from East Asia to North America and cause the anomalies of the northern hemispheric circulation. An interpretation of the dynamic mechanism of antarctic sea ice climatic effect is also proposed. (Auth. mod.)

I-46719

Kane, R.P., **Extension of antarctic ozone hole to lower latitudes in the South-American region,** *PAGEOPH,* 1991 135(4), p.611-624, Refs. p.622-624.

A comparison of monthly mean values of total ozone at South Pole, Buenos Aires (Argentina), Cachoeira Paulista and Natal (Brazil), and Huancayo (Peru) revealed that whereas South Pole showed an ozone depletion of 45% in Oct. 1987 (as compared to Oct. 1977), Buenos Aires showed a small decrease (10%) while the other locations showed very small decreases (1-2%). When daily values are considered, the antarctic ozone hole of Oct. 1987 seems to have caused 10% depletion at Buenos Aires and 5% at Natal and Huancayo in Dec. 1987. However, a large part of this is normal seasonal variation, except at Huancayo, where a residual effect of 5% depletion in Dec. 1987 remains. The QBO effects (5-8% changes in the ozone level in 2-3 years) could cause 10-15% fluctuations in solar UVB on the ground on clear-sky days, and could be a possible health hazard unless factors like cloudiness reduce the UVB intensities. (Auth.)

I-46724

Rycroft, M.J., **Atmospheric and space research from the polar regions,** *Physics education,* 1991 Vol.26, p.153-158.

The polar regions are unique laboratories for carrying out research on both the atmosphere and the near-Earth space environment. The relatively undisturbed conditions help us explore phenomena like the greenhouse effect and the springtime antarctic ozone depletion, the so-called ozone hole. Further out, UV and x-radiation from the Sun produce the Earth's ionosphere, vital for man's communication network. Yet satellite and polar research is showing us how events on the Sun can adversely affect this near-Earth space environment.

I-46742

Shudo, Y., Fukuyama, Y., Kato, Y., Miyamoto, H., **Meteorological observations at Syowa Station in 1989 by the 30th Japanese Antarctic Research Expedition,** *Antarctic record,* Nov. 1991 35(3), p.296-334, In Japanese with English summary. 9 refs.

Results of meteorological observations carried out at Showa Station from Feb. 1, 1989 to Jan. 31, 1990 are reported. The following characteristics are pointed out: the monthly mean temperature in May was -21.1C; extremely low amounts of total ozone were recorded in late Sep. through mid-Oct.; monthly averages of total ozone for Sep.-Nov. were the third lowest for those months since 1961; cyclones and strong winds blew on Feb.3, with maximum wind speed and gusts of 41.6 and 50.8 m/s, respectively, which were the maximum recorded in February. (Auth. mod.)

I-46746

Li, J.J., **Comparison of Lanzhou loess profile with Vostok ice core in Antarctica over the last glaciation cycle,** *Science in China. Series B,* Apr. 1992 35(4), p.476-487, 17 refs.

Loess near Lanzhou from the late Pleistocene was very sensitive to climatic fluctuations. The Beiyuan terrace profile in Linxia City, whose curve of susceptibility tallies with the trend of isotopic curves of the Vostok ice core in Antarctica, is 35 m thick. There are five layers of paleosols under Malan loess. The upper three layers correspond to three warm stages in the last interglaciation. Interstadial of Last Glacial (C stage in the antarctic ice core) was clearly recorded in the Beiyuan profile, in which three layers of paleosols and two of loess were formed. The lowest section of the profile belongs to the penultimate glaciation, in which fossils of cold-drought-resistant mammals and molluscs have been discovered. In this paper, these soil profiles are correlated with dates of antarctic ice cores in an effort to define present understanding of continental variations in paleoclimate and glaciation. (Auth. mod.)

I-46771

Oeschger, H., **Atmospheric CO2: global change and regulation mechanisms,** *Berichte der Bunsen-Gesellschaft für Physikalische Chemie,* Mar. 1992 96(3), p.252-257, 23 refs. Presented at Discussion Meeting of the journal: Physics and Chemistry of the Atmosphere, Schliersee, Bavaria, Oct. 7-9, 1991.

Models for the CO2 uptake by the carbon system have been developed which are capable of reproducing the result of the drop in the rate of increase of CO2 emissions from 4.5% to 2% per year following the oil embargo in 1973. Of special interest regarding the understanding of the carbon cycle and its role in controlling the climate of the Earth are the observations in polar ice cores covering the past 160,000 years, corresponding to one and a half glaciation cycles. They show variations of atmospheric CO2, CH4 and N2O parallel to the climatic variations. Measurements of C- 13/C-12 in shells of foraminiferas support the hypothesis that these CO2 changes are caused by changes in the ocean's biological pump, i.e. the flux of detrital organic carbon from the surface to the deep ocean, which affects the total inorganic carbon in the surface ocean and the partial pressure of CO2. (Auth. mod.)

I-46772

Stolarski, R.S., **Observation of global stratospheric ozone change,** *Berichte der Bunsen-Gesellschaft für Physikalische Chemie,* Mar. 1992 96(3), p.257-263, 35 refs. Presented at Discussion Meeting of the journal: Physics and Chemistry of the Atmosphere, Schliersee, Bavaria, Oct. 7-9, 1991.

Measurements of the total column amount of ozone from the Total Ozone Mapping Spectrometer (TOMS) on the Nimbus 7 satellite have now been made for 13 years. They show that the 1991 antarctic ozone hole again had a pronounced minimum in early October, indicating deep ozone holes in four of the last five years. Global scale measurements by TOMS show no trend in total ozone near the equator, but a significant trend at northern middle and high latitudes. This trend has a pronounced seasonal variation with maximum in winter. The observed trend is significantly larger than the predictions of gas-phase photochemical models. (Auth. mod.)

I-46773

Leiterer, U., Weller, M., Herber, A., **Global changes of aerosols—ground based monitoring of the optical thickness in polar regions and central Europe,** *Berichte der Bunsen-Gesellschaft für Physikalische Chemie,* Mar. 1992 96(3), p.377-380, 9 refs. Presented at Discussion Meeting of the journal: Physics and Chemistry of the Atmosphere, Schliersee, Bavaria, Oct. 7-9, 1991.

Optical thickness measurements in north polar, south polar and central European regions are presented and discussed in comparison with earlier values. Actinometer measurements of the integral optical thickness in the Arctic (Franz Joseph Land) from 1933 to 1942 show an average level of about 0.22 and only minor changes between spring and summer and from year to year. Since 1955 the spring values show a pronounced increase to 0.3 in 1985. In contrast to this behavior, the levels in Antarctica (Mirnyy) are much lower (around 0.18) and fairly stable between 1957 and 1990 except for two time periods with strong volcanic activities with peaks up to 0.28. Spectral aerosol thickness data at 500 and 1000 nm for Antarctica from 1955 to 1990 indicate marked volcanic activity with data rising from a level around 0.03 to two maxima of about 0.12. In Mar. 1989, the boundary layer extinction coefficient at 500 nm in the Arctic reached 79-fold of the Antarctic and 2.5- fold of the central Europe values at Lindenberg. The very high winter and spring aerosol extinction coefficients in the Arctic result from long-range transport and gas-to-particle conversion of NOx and SO2. (Auth. mod.)

I-46777

Colacino, M., ed, Giovanelli, G., ed, Stefanutti, L., ed, Italian Research on Antarctic Atmosphere, 1st Workshop, Porano, Nov. 11, 1988, **Conference proceedings of the Italian Research on Antarctic Atmosphere, Vol.20,** Bologna, Italian Physical Society, 1989, 232p., Refs. passim. For individual papers see I-46778 through I-46796 and K-46797.

This is a collection of papers presented at the 1st Workshop of Italian Research on Antarctic Atmosphere, held Nov. 11, 1988, in Porano, Italy. It consists of more than 20 papers divided into five fields: meteorology and climatology, aerosol and tropospheric clouds, planetary boundary layer, chemical/physical stratospheric properties, and aeronomy. Introductory speeches deal, among others, with objectives of the Italian research program in Antarctica, the current and future prospects of antarctic projects, and Italian participation in SCAR meetings.

I-46778

Stefanutti, L., **Review of the ozone hole issue as discussed at the Quadrennial Ozone Symposium in Goettingen—August 1988,** Italian Research on Antarctic Atmosphere, Conference proceedings, Vol.20, Bologna, Italian Physical Society, 1989, p.13-21, 37 refs.

Forty-four papers and a general review were presented in the ozone hole session during the Quadrennial Ozone Symposium, which took place in Goettingen in Aug. 1988. The general review was presented by G. Grasseur of the Institut d' Aeronomie Spatiale of Belgium. The papers dealt both with experimental measurements carried out in Antarctica and in the Arctic, and with climatic and chemical models. (Auth.)

I-46779
Colacino, M., **Italian researches on atmospheric physics in Antarctica: a review,** Italian Research on Antarctic Atmosphere, Conference proceedings, Vol. 20, Bologna, Italian Physical Society, 1989, p.23-36, 17 refs.

In Nov. 1988 a workshop was held in Porano, Italy on research carried out in Antarctica by Italian scientists. The purpose of the meeting was twofold: to present the results of different activities after three years of work; and to delineate the trends of development for future studies. In the present note, after a short review of the general plan of atmospheric research, the development of various projects is examined. Some remarks concerning the future are included. (Auth.)

I-46780
Pellegrini, A., Marucci, F., **Meteorological facilities at the Italian base "Terra Nova Bay Station",** Italian Research on Antarctic Atmosphere, Conference proceedings, Vol.20, Bologna, Italian Physical Society, 1989, p.39-57.

A small network of automatic weather stations has been installed at the Terra Nova Bay Station for operational and scientific purposes. Some other meteorological instruments have also been installed and tested, and their performance in that environment has been evaluated. The results of these tests are described and some examples of data are presented. (Auth.)

I-46781
Anav, A., **Some air temperature patterns recorded at Terra Nova Bay during winter 1987,** Italian Research on Antarctic Atmosphere, Conference proceedings, Vol.20, Bologna, Italian Physical Society, 1989, p.59-63.

Data obtained at meteorological stations installed at Terra Nova Bay since 1985 are discussed. The data processing systems, equipment and methods used are described, and air and ground temperature patterns recorded during winter 1987 are shown and analyzed. Planned activities for the 1988-1989 season, including the installation of 4 outer automated stations with radio transmission and one central receiving unit replacing old meteorological screens, are outlined.

I-46782
Tomasi, C., Vitale, V., Tagliazucca, M., **Atmospheric turbidity measurements at Terra Nova Bay during Jan. and Feb. 1988,** Italian Research on Antarctic Atmosphere, Conference proceedings, Vol.20, Bologna, Italian Physical Society, 1989, p.67-77, 20 refs.

The spectral measurements of direct solar irradiance, taken with a multiwavelength sun photometer at Terra Nova Bay during Jan. and Feb. 1988, are examined by the Langley plot method to check the reliability of the calibration values determined from high-mountain measurements performed in Italy. This analysis clearly shows that the output signals are affected by diffuse solar radiation entering the instrument, in spite of the narrow field of view used. Applying the Langley plot method within a limited range of air mass resulted in a new set of calibration values. The mean daily values of the atmospheric turbidity parameters alpha and beta were found to range between 0.78 and 1.53 and between 0.021 and 0.039, respectively, while the aerosol particle optical thicknesses at visible and near-infrared wavelengths showed a general tendency to gradually increase from one day to another during Jan., reaching maximum values at the beginning of Feb. (Auth. mod.)

I-46783
Ciattaglia, L., Moleti, A., **Aerosol optical depth in the antarctic atmosphere: Rayleigh scattering and ozone influence on sun photometry at Terra Nova Bay,** Italian Research on Antarctic Atmosphere, Conference proceedings, Vol.20, Bologna, Italian Physical Society, 1989, p.79-87, 1 ref.

Dual wavelength sun photometers were used at Terra Nova Bay to measure aerosol optical depth. Problems in interpretation of the data arose because of instability in the filters, and the calibration coefficients derived at a temperate zone location (Mount Cimone, 2165 ms., Italy) were not applicable in the polar region. Even allowing for filter changes it was necessary to reduce the aerosol and ozone optical depths by approximately 10%. It is concluded that values usually adopted for these coefficients at mid latitudes should be considerably reduced in the use of sun photometry in Antarctica. (Auth.)

I-46784
Santachiara, G., Prodi, F., Tagliazucca, M., **Characterization of aerosol at Terra Nova Bay, Antarctica,** Italian Research on Antarctic Atmosphere, Conference proceedings, Vol.20, Bologna, Italian Physical Society, 1989, p.89-101, 22 refs.

Antarctic aerosol was sampled at Terra Nova Bay using an inertial spectrometer at high flow rate. This instrument can sample aerosol and deposit particles on a membrane filter with size separation. The density of single particles and average density vs. aerodynamic diameter have been evaluated. Chemical composition of aerosol particles was determined by analyzing samples taken on Millipore filters by scanning electron microscope and X-ray energy spectrometer. Results show that for particles with radius $>$ 0.5 micron, frequency of sea-salts increases when aerodynamic diameter decreases. An opposite behavior is displayed by crustal elements. A chlorine loss in sea-salt particles has been observed. A mechanism for this loss is suggested. (Auth.)

I-46785
Lenaz, R., Guerzoni, S., Taviani, M., **Wind-blown particles in Terra Nova Bay, Antarctica: first results and perspectives,** Italian Research on Antarctic Atmosphere, Conference proceedings, Vol.20, Bologna, Italian Physical Society, 1989, p.103-110, 27 refs.

In the course of the 1987-1988 Italian expedition to Antarctica, 12 samples of atmospheric dust were collected by means of mesh-panels to study the eolian supply to actual sedimentation in Terra Nova Bay. This sampling system was suitable for capturing large particles mostly of autochthonous materials. Many metal and silicate spherical particles were found which are likely to have a cosmic origin. (Auth. mod.)

I-46786
Morandi, M., **Antarctic tropospheric clouds characterization using an elastic backscattering lidar,** Italian Research on Antarctic Atmosphere, Conference proceedings, Vol.20, Bologna, Italian Physical Society, 1989, p.111-120, 14 refs.

The Lidar Group of IROE is used by the Italian national program of research in Antarctica (PNRA) in two projects: the ozone hole phenomenon and antarctic climatology. In this paper, the research activities on antarctic tropospheric clouds carried out during the 1987-1988 season at the Terra Nova Bay Station are described. Future activities, dealing mainly with the ECLIPS (Experimental Clouds Lidar Pilot Study) international project, are outlined. Some experimental data are presented and the processing methods are described. (Auth. mod.)

I-46787

Bonasoni, P., Giovanelli, G., Georgiadis, T., Tagliazucca, M., **Meteorological variables and ozone concentration measured in the surface layer at the Italian station of Terra Nova Bay, Antarctica,** Italian Research on Antarctic Atmosphere, Conference proceedings, Vol.20, Bologna, Italian Physical Society, 1989, p.123-136, 19 refs.

Microclimatological, meteorological and environmental measurements were performed during Jan. and Feb. 1987-1988 at Terra Nova Bay Station to determine certain characteristics of the atmospheric surface layer, such as profiles of wind, temperature and ozone concentration versus stability. Only qualitative results are presented. The temperature measurements at various levels up to 6 m indicate that the profile is quasi permanently superadiabatic. This behavior is due to the high incoming radiation and transparency of the atmosphere. Ozone concentration measurements at 3 levels up to 10 m, averaged over 10 minutes, display profiles characterized by strong gradients. The maximum concentrations (about 30 ppb for periods of 3-4 hours) were observed in the early afternoon in connection with southeasterly winds. (Auth. mod.)

I-46788

Mastrantonio, G., Ocone, R., Fiocco, G., **Acoustic remote sensing of the antarctic boundary layer,** Italian Research on Antarctic Atmosphere, Conference proceedings, Vol.20, Bologna, Italian Physical Society, 1989, p.137-144, 9 refs.

Doppler sodar systems of increasing complexity have been successfully utilized in Antarctica during the 1986-87 and 1987-88 campaigns at Terra Nova Bay; a system is presently deployed on the Nansen Glacier. A detailed characterization of the planetary boundary layer in the coastal regions during the antarctic summer is emerging. Future plans are briefly described. (Auth.)

I-46789

Bonino, G., Longhetto, A., Trivero, P., **Radio-acoustic measurement of the vertical thermal profile in the antarctic lower troposphere,** Italian Research on Antarctic Atmosphere, Conference proceedings, Vol.20, Bologna, Italian Physical Society, 1989, p.145-152, 11 refs.

The vertical thermal profile of the antarctic planetary boundary layer (PBL) can be continuously monitored by the Radio Acoustic Sounding System (RASS). The apparatus utilizes an acoustic wavelength lambda a = 1 m. Since 1978 it has been in use for study of the PBL in the Po Valley, Italy. It will be adapted to measure the strong thermal gradients developing in the lower troposphere of Antarctica by improving the capability of the present system to sound different atmospheric layers with different acoustic frequencies. (Auth.)

I-46790

Fiocco, G., **Optical radar observations of stratospheric clouds at South Pole during winter 1988: preliminary results,** Italian Research on Antarctic Atmosphere, Conference proceedings, Vol.20, Bologna, Italian Physical Society, 1989, p.155-160, 12 refs.

Preliminary results of optical radar (lidar) observations of the antarctic atmosphere carried out at the Amundsen-Scott Station during 1988 are reported. Of particular interest is the detection of polar stratospheric clouds (PSCs) which appear at altitudes between 8 and 20 km asl. PSCs have been observed since the end of May. The phenomenon becomes fully developed around mid-June and progressively vanishes in Oct. (Auth.)

I-46791

Stefanutti, L., **Application of lidar for the antarctic stratospheric research,** Italian Research on Antarctic Atmosphere, Conference proceedings, Vol.20, Bologna, Italian Physical Society, 1989, p.161-170, 13 refs.

The mechanism of stratospheric cloud formation is described, and the usefulness of a simple elastic backscattering lidar for their observation is discussed. Some results obtained from lidar stratospheric aerosol measurements, carried out during the 1987-1988 season, are reported and presented in charts. Details are given of the design of the DIAL lidar system presently under construction to be used in measurements of the antarctic ozone hole.

I-46792

Gobbi, G.P., **Role of stratospheric clouds in the polar ozone depletion: modelling denitrification and dehydration,** Italian Research on Antarctic Atmosphere, Conference proceedings, Vol.20, Bologna, Italian Physical Society, 1989, p.171-173, 13 refs.

From a brief analysis of pertinent literature, the following conclusions are made: polar stratospheric clouds (PSCs) are regarded as major contributors to the process of ozone depletion over Antarctica. In particular, PSCs appear to have a twofold effect: they denitrify and dehydrate the stratosphere and provide the surfaces onto which ozone related reactions can take place.

I-46793

Adriani, A., Gobbi, G.P., Viterbini, M., Ugazio, S., **Balloon-borne CCD sonde for observations of stratospheric ice crystals,** Italian Research on Antarctic Atmosphere, Conference proceedings, Vol.20, Bologna, Italian Physical Society, 1989, p.175-178, 9 refs.

A proposal for in-situ inspection of polar stratospheric clouds (PSCs) was approved by the Italian Antarctic Program in 1988. A balloon-borne sonde for observations of PSC ice crystals larger than 4 microns is under development. The instrument will use microscopic techniques and CCD detection to provide images of the larger and most irregular constituents of PSCs. The sonde will ascend up to heights of approximately 20 km, thus exploring the region of maximum ozone depletion of the polar springtime stratosphere. (Auth.)

I-46794

Pitari, G., Verdecchia, M., Visconti, G., **Ozone hole simulation using a prescribed dynamical field,** Italian Research on Antarctic Atmosphere, Conference proceedings, Vol.20, Bologna, Italian Physical Society, 1989, p.179-196, Refs. p.194-196.

Different theories have been proposed recently to explain the origin and evolution in time of the ozone hole in the antarctic polar region. It is suggested that many of these theories require pure chemical perturbations, while others deal with dynamical and thermodynamical processes. It is proposed that what seems most likely is a combination of the two aspects. The numerical experiment described follows this guideline. A three dimensional transport model for the ozone was built, using the velocity and temperature fields obtained from the GFDL SKYHI-N90 model. This model covers the entire globe horizontally (with a resolution of 5 deg latitude and 18 deg longitude) and uses a total of 40 pressure levels (as in the GFDL model). Results show that chemistry and dynamics are strictly connected in the ozone hole formation and persistence.

I-46795
Giovanelli, G., Bonasoni, P., Evangelisti, F., Georgiadis, T., **Measurements of stratospheric gas absorption in UV and visible spectral regions,** Italian Research on Antarctic Atmosphere, Conference proceedings, Vol.20, Bologna, Italian Physical Society, 1989, p.197-213, 16 refs.

A photodiode array spectrometer is presented which is especially appropriate for measuring column amounts of trace gases present in the atmosphere. Its optical characteristics make it possible to investigate the spectral region from 290 to 800 nm with a resolution on the order of 0.4 nm. It is designed for use in Antarctica to measure the column amounts of O3, NO2 and OClO. This type of remote sensing system is generally used to measure scattered solar light, as well as indirect sun- or moonlight observations. The method of processing zenith sky measurements is also presented, along with the first spectra obtained of zenith sky radiation. (Auth.)

I-46796
Valenti, C., **Measurements of the ozone column amount at Terra Nova Bay. Preliminary results,** Italian Research on Antarctic Atmosphere, Conference proceedings, Vol.20, Bologna, Italian Physical Society, 1989, p.215-220, 4 refs.

During the 3rd Italian Antarctic Expedition (Dec. 1987-Feb. 1988), ozone measurements were made at Terra Nova Bay using for the first time the Brewer spectrophotometer. The instrument and type of measurements are described. The data are examined and compared to those collected with a Dobson spectrometer during the same period at Amundsen-Scott and Showa stations. It is concluded that, due to insufficiency of data, it is not possible to confirm or deny existing theories regarding the time and form of the ozone hole formation. (Auth. mod.)

I-46834
Greenfield, L.G., **Precipitation nitrogen at maritime Signy Island and continental Cape Bird, Antarctica,** *Polar biology,* Mar. 1992 11(8), p.649-653, 22 refs.

The mineral nitrogen (NH4-N+NO3-N) in precipitation occurring at continental and maritime antarctic sites has been determined. Precipitation at sites remote from animal activity contained much less mineral-N than that occurring at sites influenced by such activity. Estimates for nitrogen input at two contrasting fellfield sites, one at continental Cape Bird (dry site), the other at maritime Signy I. (wet site) are presented. At both sites precipitation N represented the major N input to fellfield biota, compared to wind blown particulate matter containing organic nitrogen or ammonia volatilized from adjacent guano soils and becoming absorbed by moist artificial soils traps. (Auth.)

I-46868
Lin, N.H., **Cloud acidity and acidic deposition in the lower troposphere and ozone depletion in the antarctic stratosphere: modeling and data analysis regarding the role of atmospheric aerosol,** Raleigh, North Carolina State University, 1991, 190p., University Microfilms order No. 92-06141, Ph.D. thesis. Refs. p.168-183.

This study is focused on the role of atmospheric aerosols in determining the cloud acidity and acidic deposition in the lower troposphere and the ozone depletion in the antarctic stratosphere. For the former, a cloud chemistry model is developed to study the in-cloud chemistry and acidity in cloud droplets. The features of the antarctic stratospheric aerosols during the ozone depletion episode of Oct. 1987 are investigated based on the SAGE II (Stratospheric Aerosol and Gas Experiment II) data. The study focuses on inferring the aerosol size spectrum using a modified randomized minimization-search-technique (RMST), and investigating the vertical, zonal and columnar averages of aerosol properties, together with the ozone concentration. The aerosol size distribution is found to be bimodal in several instances. An enhanced aerosol layer of relatively larger particles at altitudes between 21-23 km was found in the antarctic region. The relatively abundant population of smaller particles is associated with the region of severe ozone depletion. Smaller and larger particles dominate at higher and lower latitudes, respectively. It is pointed out that the reported features of the stratospheric aerosols in the antarctic region are useful in providing insights into the mechanisms for ozone depletion. (Auth. mod.)

I-46873
Krueger, A., Schoeberl, M.R., Newman, P., Stolarski, R.S., **1991 antarctic ozone hole; TOMS observations,** *Geophysical research letters,* June 19, 1992 19(12), p.1215-1218, 27 refs.

The 1991 antarctic springtime ozone decline as measured by the Total Ozone Mapping Spectrometer was similar to those of earlier deep ozone hole years, 1987, 1989, and 1990. The minimum total ozone value was recorded on Oct. 5, 1991 at 108 Dobson units near the South Pole. This was 8 DU lower than in any of the earlier years. Four of the last five years have exhibited an extensive, deep ozone hole. The area of the hole was about the same as in 1987, 1989, and 1990. The recovery from the low total ozone values occurred in mid-Nov. as the polar vortex broke up. (Auth.)

I-46874
Hernandez, G., Smith, R.W., Fraser, G.J., Jones, W.L., **Large-scale waves in the upper-mesosphere at antarctic high-latitudes,** *Geophysical research letters,* July 6, 1992 19(13), p.1347-1350, 24 refs.

Upper-mesosphere combined optical measurements of wind and temperature fields at Amundsen-Scott Station and wind radar measurements at Scott Base show the presence of large-scale waves in this region of the atmosphere. At Amundsen-Scott the largest amplitude wave observed with sub-diurnal periodicity appears with a frequency near 2.4/day (about 10.1 hour period), with a westward phase progression of wavenumber one. The presence of a wave with this periodicity is confirmed by the observations at Scott Base. The combination of the experimentally-found period and phase progression, associated small-temperature oscillations, and theoretical considerations lead to the interpretation of this wave as a Lamb wave. The present combination of spatially-resolved optical measurements and radar measurements illustrates the value of multiple-technique observations in elucidating the upper-mesosphere dynamical state, as well as the properties of the waves propagating through the medium where the observations are being made. (Auth.)

I-46875
Kroes, G.J., Clary, D.C., **Adsorption of HCl on ice under stratospheric conditions: a computational study,** *Geophysical research letters,* July 6, 1992 19(13), p.1355-1358, 14 refs.

In modelling surface adsorption of HCl on type II PSC's, the authors performed computer simulations of adsorption of HCl on single crystal ice. For stratospheric conditions, the maximum surface coverage of ice by HCl is calculated to be 0.0000001 monolayer. This value was obtained by taking surface disorder into account. It is much too low for the reaction of HCl with chloronitrate to proceed rapidly on ordinary ice in one step. The calculated value of the surface coverage is much lower than recent experimental values for the uptake of HCl by polycrystalline ice, so the validity of the interpretation of the uptake of HCl by polycrystalline ice as being due to surface adsorption is questioned. Antarctica is identified as the locale at which this computational study could be advantageously applied. (Auth. mod.)

I-46899

Japanese Antarctic Research Expedition, **Antarctic meteorological data. Vol.30. Meteorological data at the Syowa Station in 1989,** Tokyo, Japan Meteorological Agency, [1992], 274p., Refs. passim.

This set of 1989 data collected at Showa Station includes surface reports comprised of monthly and daily summaries and synoptic data; aerological data comprised of monthly summaries and upper air observations; global solar radiation measurements comprised of monthly summaries and hourly readings; atmospheric turbidity measurements comprised of daily summaries; and total ozone, vertical ozone and long wave radiation data, with explanatory notes for interpretation of tables and on instruments and observation techniques.

I-46900

Japanese Antarctic Research Expedition, **Antarctic meteorological data. Vol.31. Meteorological data at Syowa Station and Asuka Camp in 1990,** Tokyo, Japan Meteorological Agency, [1992], 384p., Refs. passim.

This set of 1990 data collected at Showa and Asuka Stations includes surface reports comprised of monthly and daily summaries and synoptic data; aerological data comprised of monthly summaries and upper air observations; global solar radiation measurements comprised of monthly summaries and hourly readings; atmospheric turbidity measurements comprised of daily summaries; and total ozone, vertical ozone and long wave radiation data, with explanatory notes for interpretation of tables and on instruments and observation techniques.

I-46901

Torres, O., Ahmad, Z., Herman, J.R., **Optical effects of polar stratospheric clouds on the retrieval of TOMS total ozone,** *Journal of geophysical research,* Aug. 20, 1992 97(D12), p.13,015-13,024, 34 refs.

Small areas of sharply reduced ozone density appear frequently in the maps produced from polar region total ozone mapping spectrometer (TOMS) data. These mini-holes are of the order of 1000 km in extent, with a lifetime of a few days. On the basis of measurements from ground-based instruments, balloon-borne ozonesondes, and simultaneous measurements of aerosol and ozone concentrations during aircraft flights in the arctic and antarctic regions, the appearance of polar stratospheric clouds (PSCs) are frequently associated with false reductions in ozone derived from the TOMS albedo data. By combining radiative transfer calculations with the observed PSC and ozone data, it is shown that PSCs located near or above the ozone density maximum (with optical thickness greater than 0.1) can explain most of the differences between TOMS ozone data and ground or *in-situ* ozone measurements. Several examples of the real and false TOMS mini-hole phenomenon are investigated using data from the 1989 Airborne Arctic Stratospheric Expedition (AASE) and from balloon flights over Norway and Sweden. (Auth. mod.)

I-46924

Deutsche Meteorologen-Tagung, Berlin, Mar. 16-20, 1992, **German Meteorologists Meeting 1992,** *Deutscher Wetterdienst, Offenbach am Main. Annalen der Meteorologie,* 1992 No.27, 425p., In German. Refs. passim. For selected papers see 47-210 through 47-218 or I-46925 through I-46928.

This is one of a series of German meteorologists meetings. The main topics of this meeting are synoptics and fronts, interaction of the atmosphere and biosphere, current problems of theoretical meteorology, the middle atmosphere, ocean circulation, climate diagnostics and modeling, and mesoscale processes. Of pertinence to the Antarctic are papers on ozone and planetary waves; geostrophic wind and sea ice motion; and heat exchange between sea ice, the ocean, and the atmosphere.

I-46925

Wirth, V., **Model for quasi-stationary planetary waves in the total ozone** [Ein Modell für quasi-stationäre planetare Wellen im Gesamtozon], *Deutscher Wetterdienst, Offenbach am Main. Annalen der Meteorologie,* 1992 No.27, Deutsche Meteorologen-Tagung (German Meteorologists Meeting), Berlin, Mar. 16-20, 1992, p.192-193, In German. 5 refs.

The stationary total ozone wave may vary from the average by more than 12 Dobson units, with the lowest levels occurring in January in the Northern Hemisphere and in October in the Southern Hemisphere. Temperature and dynamic wave processes in the lower stratosphere appear to be more significant than photochemical processes. The proposed model simulates wave number 1 well in both hemispheres and wave number 2 as well in the Southern Hemisphere.

I-46926

Olf, J., **Geostrophic wind and sea ice motion in the Weddell Sea** [Geostrophischer Wind und Meereisbewegung in der Weddell-See], *Deutscher Wetterdienst, Offenbach am Main. Annalen der Meteorologie,* 1992 No.27, Deutsche Meteorologen-Tagung (German Meteorologists Meeting), Berlin, Mar. 16-20, 1992, p.228-229, In German. 4 refs.

Sea ice drift in the Weddell Sea was measured by satellite tracking of Argos drift buoys in October 1986 as part of the Winter Weddell Sea Project 1986. The large-scale structure of the Weddell Gyre may be derived from the ice drift data. The ice drift vector, D, is found from the equation D = AG + M + epsilon, where G and M are the geostrophic wind and ocean current vectors, A is a complex coefficient taking into account the wind factor and the angle between the current direction and the geostrophic wind, and epsilon includes all the other parts of the ice drift vector that are neither constants nor linear functions of the geostrophic wind. Here, A = /A/ e exp -i theta. The average value of /A/ was 0.015 and theta was 3.6.

I-46927

Dutz, S., Roth, R., **Sensible heat flux over open water and sea ice in the Weddell Sea** [Strom fühlbarer Wärme über offenem Wasser und Meereis in der Weddell-See], *Deutscher Wetterdienst, Offenbach am Main. Annalen der Meteorologie,* 1992 No.27, Deutsche Meteorologen-Tagung (German Meteorologists Meeting), Berlin, Mar. 16-20, 1992, p.317-318, In German. 5 refs.

Sensible heat flux between open water, sea ice, and the atmosphere in the Weddell Sea, was measured by drift buoys from February through July 1989. The heat loss from the ocean through the ice cover to the atmosphere was noticeably less than expected. The average monthly sensible heat fluxes in W/sq m, from February through July, were respectively, 31, 22, 25, 8, -1, and 7. The growth rate of the ice in February was .09 cm/d and in May was only .02 cm/d.

I-46928

Frieden, W., **Turbulent heat exchange between sea ice and the atmosphere in the Weddell Sea (Antarctica)** [Turbulenter Wärmeaustausch zwischen Meereis und Atmosphäre im Weddell-Meer (Antarktis)], *Deutscher Wetterdienst, Offenbach am Main. Annalen der Meteorologie,* 1992 No.27, Deutsche Meteorologen-Tagung (German Meteorologists Meeting), Berlin, Mar. 16-20, 1992, p.338-339, In German. 3 refs.

Turbulent heat exchange between the sea ice and atmosphere was measured in the Winter Weddell Gyre Study 1989. There was only a slight heat flux between the atmosphere and ice from +25 to -35 W/sq m. In late winter, there was an average thermal conductive flux from the ice to the atmosphere of 20-30 W/sq m, indicating an ice growth of 6-9 mm/day. Turbulent flow in the atmospheric boundary layer is strongly affected by the wind velocity and air temperature spectra. The shape of the wind velocity spectra in the inertial subrange corresponds to the 5/3 law of Kolmogorov and the air temperature spectra are strongly suppressed in the inertial subrange.

I-46931
Rojas, C.M., Van Grieken, R.E., Cantillano, M.E., **Study of antarctic aerosol using X-ray fluorescence and single particle analysis,** *Santiago de Chile. Instituto Antártico Chileno. Serie científica,* 1992 No.42, p.37-45, 17 refs.

During the 24th Chilean Antarctic Expedition a set of 8 aerosol samples was collected at the Bernardo O'Higgins Station. The samples were analyzed by electron-probe X-ray microanalysis (EPXMA) and energy-dispersive X-ray fluorescence (EDXRF). Concentrations of the detected elements (Si, P, S, K, Ca, Fe, Ni, Cu, Zn and Pb) are much higher than those reported in the literature. The aerosol had a predominant marine origin and high Zn concentrations, suggesting the presence of an anthropogenic source such as incineration waste. Individual particle analysis showed that the fine fraction had an average diameter of 0.67 micron, whereas that of the coarse fraction was 5.6 microns. Both fine and coarse mode aerosols presented a log-normal size distribution. (Auth.)

I-46983
Fuwa, K., **Monitoring of the global environment—Participation of Japan and other Asian countries,** *Pure and applied chemistry,* Apr. 1992 64(4), p.473-484, 20 refs.

Elemental and organic carbons in aerosol samples, collected on board the research vessel *Shirase* during her voyage between Japan and Antarctica through the southwestern Pacific Ocean in 1988, were analyzed. The schematic diagram of the carbon analysis system, and the results, are shown in figures. There was an obvious decrease of both elemental and organic carbons as the ship approached Antarctica, indicating a decrease of total chemical substances released into the air.

I-46984
Tominaga, T., **Chlorofluorocarbons in the atmosphere: trends and vertical profiles,** *Pure and applied chemistry,* Apr. 1992 64(4), p.529-536, 14 refs.

An extremely clean analytical system has been developed for accurate analysis of atmospheric chlorofluorocarbons, carbon tetrachloride, methyl chloroform and other halocarbons. Atmospheric samples were collected at the surface level in Japan and Antarctica by grab-sampling and analyzed by ECD gas chromatography. The background atmospheric concentrations of CCl3F (CFC-11) and CCl2F2 (CFC-12) in the mid- latitude Northern Hemisphere have been increasing by 4% a year over the past decade. The concentrations of CFC-11 and CFC-12 observed in Antarctica have been 8-10% lower than those observed in the Northern Hemisphere, in accordance with the predominant emission of chlorofluorocarbons in the Northern Hemisphere and the delay (about 2 years) in their diffusion into the Southern Hemisphere across the Intertropical Convergence Zone. The CCl2FCClF2 (CFC-113) concentration in the atmosphere tends to increase much faster than that of CFC-11 or CFC-12. (Auth. mod.)

I-46986
Lehmann, P., **Long-term winter total ozone changes at Macquarie Island,** *Geophysical research letters,* July 24, 1992 19(14), p.1459-1462, 9 refs.

Measurements of total ozone at Macquarie I. reveal statistically significant reductions of approximately 12% during July to Sept. when comparing the mean levels for 1987-90 with those in the seventies. A back-correction of 1963-79 Macquarie I. monthly mean ozone data is described which allowed this comparison. (Auth.)

I-46987
Lehmann, P., **Investigation into the causes of stratospheric ozone loss in the southern Australasian region,** *Geophysical research letters,* July 24, 1992 19(14), p.1463-1466, 18 refs.

Measurements of total ozone at Macquarie I. reveal statistically significant reductions of approximately 12% during July to Sept. when comparing the mean levels for 1987-90 with those in the seventies. In order to investigate the possibility that these ozone changes may not be a result of dynamic variability of the stratosphere, a simple linear model of ozone was created from statistical analysis of tropopause height and isentropic transient eddy heat flux, which were assumed representative of the dominant dynamic influences. Comparison of measured and modelled ozone indicates that the recent downward trend in ozone at Macquarie I. is not related to stratospheric dynamic variability, and therefore suggests another mechanism, possibly changes in photochemical destruction of ozone. (Auth.

I-46988
Mak, J.E., Brenninkmeijer, C.A.M., Manning, M.R., **Evidence for a missing carbon monoxide sink based on tropospheric measurements of CO-14,** *Geophysical research letters,* July 24, 1992 19(14), p.1467-1470, 18 refs.

An important problem in atmospheric chemistry is the determination of the oxidative capacity of the troposphere, which provides an index of how quickly trace gas species are destroyed. Central to this question are the abundance and distribution of hydroxyl radical, which is responsible for the destruction of a large proportion of chemical compounds such as CH4, CO, and nonmethane hydrocarbons. CO-14 can be used as a chemical tracer to help constrain the OH concentration, as oxidation via OH is the major sink for all carbon monoxide. The authors present the first CO-14 observations in the free troposphere during different seasons from 90S to 34N. Model simulations suggest that a large increase in the carbon monoxide sink strength may be needed in order to accommodate the experimental results. (Auth.)

I-47000
Hanson, D.R., **Laboratory studies of stratospheric trace constituents: ozone and nitric acid,** Duluth, University of Minnesota, 1989, 85p., University Microfilms order No. 89-12805, Ph.D. thesis. Refs. passim.

Models have been developed to understand and predict ozone trends in order to determine man-made perturbations to the ozone layer. A major anthropogenic ozone-destroying catalyst is chlorine; it is believed to be responsible for recent depletion of ozone levels at high altitudes globally and also for the antarctic ozone hole. There has been an effort to intercompare balloon-borne ozone monitors, especially at high altitudes, to develop a set of instruments to detect small changes in ozone. An ozone calibration system has been developed that simulates stratospheric ozone concentration. In the process of developing this system, a determination of the vapor pressure of ozone was made at liquid nitrogen temperatures. The pressure was measured to an accuracy within 1%, thus providing a well-known reproducible ozone concentration that can be used as an absolute ozone standard. Results support the claim that chlorine is directly responsible for the ozone hole. (Auth. mod.)

I-47018

Higashi, A., **Global warming and sea level rise—discussions and report from IPCC workshop,** *Polar news,* Mar. 1991 No.52, p.58-65, In Japanese. 7 refs.

A report on global warming and sea level rise, presented to a 1989 workshop of the Intergovernmental Panel on Climate Change (IPCC), is discussed. Contributing factors to sea level rise accompanying global warming, induced by increasing CO2 concentrations in the atmosphere, are thermal expansion of sea water and the accelerated melting of the antarctic and Greenland ice sheets and other glaciers throughout the world. The major factor is the antarctic ice sheet with its 29,-330,000 cu km of ice which would raise the world sea level 65 m if it were all melted. The Greenland ice sheet with 2,950,000 cu km of ice would raise the world sea level an additional 7 m. If CO2 concentrations continue to increase at their current rate and average air temperatures increase 1.5, 2.5, or 4.5 C, the predicted rise in sea level is respectively, 8, 18, or 29 cm by the year 2030, and 31, 66, or 110 cm by the year 2100.

I-47025

Loureiro, A.L.M., Vasconcellos, M.B.A., Pereira, E.B., **Trace element determination in aerosols from the Antarctic Peninsula by neutron activation analysis,** *Journal of radioanalytical and nuclear chemistry, articles,* May 1992 159(1), p.21-28, 14 refs.

Knowledge of the composition of atmospheric aerosols in remote areas, such as the Antarctic Peninsula, is of great importance for the study of long-range transport of atmospheric contaminants and also from the climatological perspective. In the present work, instrumental neutron activation analysis was applied to determine the presence of various chemical elements in aerosol samples collected in the region of the Comandante Ferraz Station on King George I. Sea and soil were identified as the major sources of aerosols in the collected samples. (Auth. mod.)

I-47047

Martinerie, P., **Physical and climatic parameters which influence the air content in polar ice,** *Earth and planetary science letters,* Aug. 1992 112(1/4), p.1-13, 22 refs.

Under present climatic conditions, the air content of polar ice *(V)* generally shows a high sensitivity to the atmospheric pressure and hence to the surface elevation of the ice sheet where the ice is formed. The results presented here are from 16 different sites (14 in Antarctica, one in Greenland and one in the Yukon Territory, Canada), and they allow a better understanding of the parameters which influence the air content in ice. It is demonstrated that *V* can be expressed very simply as a function of the atmospheric pressure *(Pi),* the temperature *(Ti)* and the porous volume of ice *(Vi)* at which the air in the firn becomes isolated in terms of pressure from the atmosphere during the process of pore close-off. Results confirm a *Vi* increase with temperature and show no clear *Vi* dependence on snow accumulation rate. The possible non-linearity of the *Vi-Ti* relation obtained could be due to a wind influence on *Vi* and/or to a second-order effect of the accumulation rate. The *Vi* results are compared to measurements of the volume of closed pores versus depth in the firn. In closing, the authors discuss the parameterization that can be obtained to interpret the air content variations observed in deep ice cores (over periods covering glacial-interglacial transitions) in terms of paleoclimatic conditions prevailing at the surface of the ice sheet. (Auth.)

I-47049

Obleitner, F., **Atmospheric turbidity at the antarctic coastal station Georg-von-Neumayer (70S, 8W, 40 m MSL),** *Journal of applied meteorology,* Oct. 1992 31(10), p.1202-1209, 36 refs.

Spectral actinometric measurements of direct solar radiation were made at the Georg von Neumayer Station on all 17 clear days during 1981/82. From broadband measurements using cutoff filters, a number of common measures for aerosol extinction as well as precipitable-water content of the atmosphere were derived by numerical analysis. Average Angström turbidity coefficient, wavelength exponent, aerosol optical depth, and mean precipitable water were determined, matching the regional pattern known until now. Monthly as well as daily variations of observed atmospheric turbidity are discussed with respect to prevailing winds, synoptic patterns, and topography, revealing lowest turbidity for southwesterly flow. A review of 30 years of compatible aerosol optical thickness measurements at antarctic coastal stations is included. (Auth. mod.)

I-47054

Hofmann, D.J., **Observation and possible causes of new ozone depletion in Antarctica in 1991,** *Nature,* Sep.24, 1992 359(6393), p.283-287, 23 refs.

Local ozone reductions approaching 50% in magnitude were observed during the antarctic spring in the 11-13 and 25-30 km altitude regions over South Pole and McMurdo Stations in 1991. These reductions, at altitudes where depletion has not been observed previously, resulted in a late September total ozone column 10-15% lower than previous years. The added depletion in the lower stratosphere was observed to coincide with penetration into the polar vortex of highly enhanced concentrations of aerosol particles from volcanic activity in 1991.

I-47128

Larson, S.H.H., Hendricsen, K., **Antarctic "ozone hole" compared to ozone behavior in the Arctic,** *Geomagnetism and aeronomy,* 1991 31(3), p.384-387, Translated from Geomagnetizm i aeronomiia. 10 refs.

Data characterizing the formation of the ozone hole in Antarctica are discussed. The ozone hole is a reduction in the total ozone concentration in the atmosphere from 300 Dobson units (D.u.) during the International Geophysical Year (1957-1958) to 120 D.u. in Sep.-Oct. 1987. In 1988 the ozone concentration near the ozone hole jumped significantly, to 210 D.u. Phenomena similar to the ozone hole have not been observed in the Arctic. The decisive factors in the formation of the ozone hole include low temperatures, polar stratospheric clouds, and solar radiation. Chlorine from both anthropogenic and natural sources also plays a determinant role. (Auth.)

I-47145

Fiocco, G., Cacciani, M., Di Girolamo, P., Fuà, D., **Stratospheric clouds at South Pole during 1988. 1. Results of lidar observations and their relationship to temperature,** *Journal of geophysical research,* Apr. 20, 1992 97(D5), p.5939-5946, 21 refs.

An optical radar—lidar—has been operational at the Amundsen-Scott South Pole Station since summer 1987-1988. The observations were specially directed to the detection of aerosol layers and polar stratospheric clouds (PSCs). The lidar utilized a Nd-YAG laser followed by a second harmonic generator, and a 0.5 m diameter Cassegrain receiving telescope. Results obtained during the period May-Oct. 1988 are summarized. Some 10,000 profiles of the lidar echoes, each the result of 1-min averaging, were obtained. Data sets consisting of profiles of the scattering ratio and of the backscattering cross section *Ba,* based on half-hour averaging, are presented. The data can be related to profiles of the atmospheric temperature *T,* usually obtained on a daily basis at South Pole. Stratifications appear to have two distinct types of structures: one structure shows only a modest variation with height; the other is characterized by sharp features, with large changes of the cross section with height. The basic results, the relationship between *Ba* and *T,* and their statistical relevance are considered in this paper. The microphysical interpretation, the attribution of these structures to PSC Type 1 and Type II, respectively involving the condensation of nitric acid trihydrate and of water ice, and the seasonal evolution of the phenomena are treated in a companion paper. (Auth.)

I-47146

Fuà, D., **Stratospheric clouds at South Pole during 1988. 2. Their evolution in relation to atmospheric structure and composition,** *Journal of geophysical research,* Apr. 20, 1992 97(D5), p.5947-5952, 7 refs.

A lidar was installed at the Amundsen-Scott South Pole Station in the austral summer 1987-1988; aerosol layers, generically identified as polar stratospheric clouds, were frequently observed in the period May-Oct. 1988 through the altitude range 8-20 km. On the basis of previous work the behavior of the aerosol backscattering cross section *Ba* has been related to the temperature *T* through linear fits between the two variables. The resulting coefficients, namely the slope *b=dBa/dT* and *Tf,* the temperature at which the onset of condensation occurs, help to classify these clouds as Type I or II, in view of the thermodynamic properties of the condensing species. A strong dependence of *Ba* on *T,* represented by a large value of *b,* is interpreted as evidence of ice condensation and leads the authors to identify the cloud as Type II, while a lower value of *b,* characteristic of diffuse structures, is taken as evidence for Type I clouds, composed of nitric acid trihydrate. The evolution of these features is reported. Type II clouds, appearing as sharp layers of moderate vertical extent, are almost always present in the interval from June to early Sep. The temperature at the base of the lowest layer spans an initial value around 198 K to a final value in Sep. around 196 K, with a corresponding height value from around 13.5 km to 10.5 km. Layers that are identified as Type I clouds appeared at higher temperatures with an onset at the beginning of the season around 200 K to a final value at mid-Oct. around 203 K. (Auth.)

I-47151

Uruguay. Dirección Nacional de Meteorología, **Meteorological investigations in Antarctica** [Investigación científico-meteorológica en la Antártida], *Montevideo. Instituto Antártico Uruguayo. Actividad científica 1987/88,* Sep. 1989 Vol.3, p.7-11, In Spanish with English summary.

Uruguay's research activities in the Antarctic are carried out by the National Meteorology Directorate in cooperation with the Uruguayan Antarctic Institute. As a part of the program's implementation, the meteorological station Dinamet-Uruguay (89054) has been operative at Artigas Station since 1986. Various projects carried out are listed, and charts are provided for monthly air temperature, pressure and precipitation for the period Jan. 1986-Dec. 1988.

I-47206

Taljaard, J.J., Steyn, P.C.L., **Relationships between atmospheric circulation and rainfall in the South African region,** *South Africa. Weather Bureau. Technical paper,* July 1991 No.24, 62p., Refs. p.59-62.

Upper-air sounding statistics for the period 1968-1987 for South Africa, Gough and Marion islands, the grid-point data of the daily ECMWF sea-level and upper-air analyses, and the deduced monthly anomalies of sea-level pressure and isobaric height are discussed and presented in charts and graphs. Gough and Marion Island upper winds in relation to South African rainfall are considered.

I-47225

Fisher, D.A., **Stable isotope simulations using a regional stable isotope model coupled to a zonally averaged global model,** *Cold regions science and technology,* Sep. 1992 21(1), p.61-77, 46 refs.

A global zonally averaged stable isotope model is reviewed, checked and used to give input to a regional model that uses precipitation along assumed vapor trajectories to predict (delta)O-18 and deuterium excess in Arctic Canada, NW Greenland, Central Greenland, East Antarctica, Victoria Land and on the Ross Ice Shelf. Where there is predominantly a single moisture trajectory, the model works well, but it does not fit the data in regions like Central Greenland (Crête) that would seem to have no predominant regional moisture path. Cloud supersaturation, seasonal precipitation and the temperature at which clouds shift from water droplets to ice crystals are emphasized. (Auth. mod.)

I-47238

Bodhaine, B.A., **Symposium on the tropospheric chemistry of the antarctic region,** *Tellus,* Sep. 1992 44B(4), p.250-251.

The sessions of the International Symposium on the Tropospheric Chemistry of the Antarctic Region, held June 3-5, 1991, in Boulder, CO, and the workshop discussions which followed on June 6, 1991, are summarized. Workshop sessions addressed the research in antarctic tropospheric chemistry that is necessary for a better understanding of global change and its impact on the antarctic region. Sessions covered tropospheric gases, aerosols and clouds, air-snow exchange, glacial records, transport, and troposphere/stratosphere exchange.

I-47239

Rudolph, J., Khedim, A., Clarkson, T., Wagenbach, D., **Long-term measurements of light alkanes and acetylene in the antarctic troposphere,** *Tellus,* Sep. 1992 44B(4), p.252-261, 26 refs.

Between 1982 and 1989, biweekly whole air samples were collected at the Georg von Neumayer Station. A smaller number of samples were taken in 1988 and 1989 at Scott Base. These samples were analyzed for several light hydrocarbons and halocarbons. For the light alkanes and acetylene, the average results from the two stations, which are located on opposite coasts of Antarctica, agree. The annual mean values for ethane, propane, n-butane, i-pentane and acetylene are 380 +/- ppt, 84 +/- 4 ppt, 50 +/- 4 ppt, 15 +/- 2 ppt, and 17 +/- 1 ppt, respectively. The mixing ratios of ethane, propane, and i-pentane show a seasonal cycle with a peak in Aug., a minimum in Feb. and an average maximum to minimum variation of 40-50%. Acetylene also shows a maximum around Aug., but its seasonal variation is higher by a factor of three. For ethane, propane and acetylene, the measurements indicate that during the last few years, the average mixing ratios in austral winter have slightly increased. A possible explanation of this secular trend is the increase of biomass burning in the Southern Hemisphere. This is also consistent with the assumption that part of the seasonal variation found for ethane, propane and acetylene reflects the seasonal dependence of biomass burning. (Auth.)

I-47240

Murayama, S., **Variations of tropospheric ozone concentration over Syowa Station, Antarctica,** *Tellus,* Sep. 1992 44B(4), p.262-272, Refs. p.271-272.

Aircraft measurements of tropospheric O3 concentration were made over Showa Station from May 1989 to Jan. 1990, except during the polar night months of June and July. The O3 concentration increased with height for the whole period of the measurements. Lower tropospheric O3 showed a prominent seasonal variation with maximum concentration in winter and minimum concentration in summer, which is very close to the result of continuous O3 measurements initiated at Showa Station in Feb. 1988. In the upper troposphere, the concentration reached high values in winter, decreased gradually until late spring and then increased again. As a result, the height-dependent difference of the concentration was reduced from late autumn to early spring and enhanced in remaining seasons of the year. The seasonal variation of upper tropospheric O3 was similar to those of the lower stratospheric O3 concentration measured by ozonesondes and the total amount of O3 by a Dobson spectrophotometer over Showa Station. It is suggested that air with low O3 concentrations is transported from subpolar or middle latitudes to Showa Station through the lower troposphere from spring to early autumn, in addition to the photochemical destruction of O3 near the station. (Auth. mod.)

I-47241
Aoki, S., Nakazawa, T., Murayama, S., Kawaguchi, S., **Measurements of atmospheric methane at the Japanese antarctic station, Syowa,** *Tellus,* Sep. 1992 44B(4), p.273-281, 21 refs.

Precise and continuous measurements of atmospheric CH4 concentration were initiated at Showa Station in Feb. 1988, using a gas chromatograph equipped with a flame ionization detector. The measurement precision was typically 0.07% in a concentration range of 0.5 to 2.5 ppmv. The standard gases were CH4-in-air mixtures and their CH4 concentrations were determined gravimetrically with uncertainties of 0.2%. The CH4 concentrations measured at the station were extremely stable, and outliers due to local contamination such as station activities were not found. A diurnal CH4 variation was hardly observable throughout the year. The average seasonal CH4 variation showed minimum and maximum concentrations in early Mar. and late Sep., respectively, and a peak-to-peak amplitude of 30 ppbv. Annual mean values of the CH4 concentration were 1640 and 1651 ppbv in 1988 and 1989, respectively. A concentration difference of 11 ppbv between the two years may suggest that the recent annual increase rate of CH4 concentration is smaller than previously reported values of about 1%/year. (Auth.)

I-47242
Etheridge, D.M., Pearman, G.I., Fraser, P.J., **Changes in tropospheric methane between 1841 and 1978 from a high accumulation-rate antarctic ice core,** *Tellus,* Sep. 1992 44B(4), p.282-294, Refs. p.292-294.

To determine in detail how the concentration of tropospheric methane has changed from pre-industrial until recent times, an ice core with remarkably fine air-age resolution was investigated. The core, called DE08, contains air from as recent as 1978 with an age resolution of about 14 years. It was drilled from a region of Law Dome with extremely high snow-accumulation rate. The ice chronology was determined from the observed chemical and isotopic seasonal variations, verified against a volcanic horizon. The mean air-age was 35 years younger than the host ice except for air in summer ice layers, which was 37 years younger than the host ice. The extracted ice-core air was analyzed for methane using gas chromatography with flame-ionization detection. Methane concentrations in the DE08 record increased from 823 parts per billion by volume (ppbv, in dry air) in 1841 to 1481 ppbv in 1978. The DE08 record shows that methane growth rates have generally increased since the onset of the industrial revolution to a level of 14 ppbv/year (about 1% per year) by the 1970s. The exception was between about 1920-1945 when the growth rate stabilized at about 5 ppbv/year. (Auth. mod.)

I-47244
Guerzoni, S., **Geochemistry of airborne particles from the lower troposphere of Terra Nova Bay, Antarctica,** *Tellus,* Sep. 1992 44B(4), p.304-310, 29 refs.

Major and trace constituents (soluble + insoluble) of wind-blown particles collected at Terra Nova Bay were studied and the data compared with lacustrine and marine sediments from the same area and the Ross Sea. Compared to the geochemical composition of the other local sediments, the aerosol was found to be slightly enriched in femic minerals and depleted in Si. The Transantarctic Mountains (granitoids and metamorphic rocks) are proposed as the main source of the large (D>4 microns) insoluble particles, with a possible contribution from nearby volcanoes. The soluble fraction accounts for more than 2/3 of the total mass loading and is mainly composed of marine salts. Some traces of contamination due to emissions from human activities were found in the aerosol, with mean Pb enrichment factor (EFcrust) value of 181. Crustal Pb contribution accounts for less than 10%, marine Pb less than 0.01% and 90% of Pb is unaccounted for. (Auth.)

I-47245
Jaenicke, R., **Condensation nuclei at the German antarctic station "Georg von Neumayer",** *Tellus,* Sep. 1992 44B(4), p.311-317, 20 refs.

Evaluations of measurements of the tropospheric surface condensation nuclei at Georg von Neumayer Station for the last 8 years are presented. They show clearly the annual variation of the concentration with a maximum in austral summer, as previously seen by other investigators. In addition, a pronounced increase in concentration of 9.63% per year has been found. The size distributions of the condensation nuclei of measurements over 2 years are evaluated and discussed. On average, they are of mono-modal shape, but individually most of them show a bimodal shape. (Auth.)

I-47246
Artaxo, P., Rabello, M.L.C., Maenhaut, W., Van Grieken, R.E., **Trace elements and individual particle analysis of atmospheric aerosols from the Antarctic Peninsula,** *Tellus,* Sep. 1992 44B(4), p.318-334, Refs. p.331-334.

Atmospheric aerosols have been sampled continuously since Dec. 1985 at the Comandante Ferraz Station. The concentration of elements with Z>10 was measured by particle-induced X-ray emission (PIXE) analysis. This yielded data for the concentration of 23 elements: Na, Mg, Al, Si, P, S, Cl, K, Ca, Ti, V, Cr, Mn, Fe, Ni, Cu, Zn, Se, Br, Rb, Sr, Zr and Pb. The fine and coarse aerosol mass concentration was determined by gravimetric analysis. Absolute principal factor analysis (APFA) was used to obtain the aerosol elemental source profiles. Non-sea-salt sulfate showed a clear seasonal pattern, with minimum during wintertime. For summer and wintertime coarse particles, only two factors were significant, with the first having high loadings for Na, Mg, Cl, S, Sr, K, Ca and the coarse particle mass concentration (representing sea-salt aerosol). The second factor had high loadings for Al, Si, Fe, Ti, and Ca (soil dust aerosol). For the fine mode particles, three factors were differentiated, and they represented sea-salt aerosol, soil dust and sulfates. The sea-salt source profile agreed with the average sea-water elemental composition to within 20% for the elements Na, Mg, S, Cl, K, Ca and Br. (Auth. mod.)

I-47247
Delmas, R.J., Kirchner, S., Palais, J.M., Petit, J.R., **1000 years of explosive volcanism recorded at the South Pole,** *Tellus,* Sep. 1992 44B(4), p.335-350, Refs. p.349-350.

Cataclysmic volcanic eruptions generally disturb the global atmosphere markedly for around 2 years. During that time, long-life volcanic products (mainly H2SO4), stored in the stratosphere gradually return to the troposphere. Antarctic snow may be subsequently contaminated and acid signals recorded. The recovery of these signals along antarctic ice cores provides a history of past volcanic events, most often of global, but sometimes of just regional, significance. Several physical and chemical techniques have been used to analyze a 1000-year ice core drilled near Amundsen-Scott Base. Acid and ultrafine ash deposits of volcanic origin have been carefully investigated. 23 major volcanic eruptions have been detected, dated and tentatively identified. The results have been compared with similar antarctic and Greenland records. The amount of volcanic sulfate deposited in antarctic snow, calculated and averaged over the last millennium, is, however, minor (13% of the total sulfate) in comparison with that of marine biogenic source. The 19th century was the period of the millennium most seriously disturbed by global explosive volcanic activity. The chlorine cycle, as recorded in antarctic ice, seems to be little affected even by such a large event as Tambora in 1815. (Auth.)

I-47249

Law, R., Simmonds, I., Budd, W.F., **Application of an atmospheric tracer model to high southern latitudes,** *Tellus,* Sep. 1992 44B(4), p.358-370, 22 refs.

The development of a global three-dimensional tracer model is discussed. It is used to examine the atmospheric dispersal of passive tracer gases, particularly carbon dioxide, and their transport to Antarctica and the southern ocean. The tracer model is based on the University of Melbourne General Circulation Model and includes the effect of convective transport. Results indicate the importance of a realistic treatment of the effect of convection. The model is applied to the dispersion of idealized distributions of tracer to determine atmospheric transport times, particularly the time taken for the "trace front" to reach the antarctic coast and the South Pole in the case of clouds initialized at three latitudinal domains. The transport in all cases is seen to be very rapid south of about 45S; this is due to the mixing associated with the strong and numerous transient disturbances at these latitudes in the Southern Hemisphere. The model is also used with an inverse technique and an annual mean carbon dioxide type distribution to deduce apparent sources and sinks of this gas. (Auth. mod.)

I-47250

Genthon, C., **Simulations of desert dust and sea-salt aerosols in Antarctica with a general circulation model of the atmosphere,** *Tellus,* Sep. 1992 44B(4), p.371-389, Refs. p.387-389.

A coupled aerosol/climate model, elaborated on the basis of a general circulation model of the atmosphere, is used to study the features of desert dust and sea-salt aerosols in the antarctic region. Some of the observed seasonal characteristics of the two tracers are well simulated, and they are interpreted in terms of their relations with components of the atmospheric circulation. The model exhibits a strong influence of the boundary layer stability on the aerosols' vertical distributions near the surface. Observation at surface level may therefore be very misleading with respect to concentrations and seasonal variability higher in the atmosphere. An ice age experiment is run with the same aerosol/climate model, but fails to reproduce an expected large increase of dust and sea-salt concentrations in surface snow. The simulated enhancements of the production rates and atmospheric transport efficiency are weak. Changes in the distribution of the sources of dust, ignored in the experiment, could therefore have largely contributed to the last ice age dust increase. (Auth. mod.)

I-47251

Nogués-Paegle, J., Mo, K.C., Callahan, K.P., **Lower stratosphere waves during 1986-1989 southern springs,** *Tellus,* Sep. 1992 44B(4), p.390-408, 13 refs.

This paper describes the horizontal structure of ozone and 50 mb height waves for the 1986-1989 springs of the Southern Hemisphere, using global NMC height analyses and Nimbus 7 TOMS Grid-T Version 6 data. Empirical Orthogonal Functions (EOFs) are obtained for the ozone and height data independently to identify the meridional structure of observed long waves as well as their propagation characteristics. It is found that the leading EOFs for both the ozone and 50 mb height waves exhibit wavenumber 1 and 2 patterns. The wave 1 pattern is usually centered at 60-65S and it either propagates eastward with a period of 30 days or longer (1986, 1987, 1989) or it is quasi-stationary (1988). This wave was weak during 1987, a year with low ozone values which persisted into summer. The wave 2 pattern travels eastward with a period of 10-12 days. The observed total ozone amplitudes for waves 1 and 2 for most years are consistent with the total ozone predictions by the wave model. In contrast, during 1989, a year with a well-defined vertically propagating wave 1, the linear model overpredicts the observed ozone wave amplitude by a factor of 2. (Auth. mod.)

I-47252

Harris, J.M., **Analysis of 5-day midtropospheric flow patterns for the South Pole: 1985-1989,** *Tellus,* Sep. 1992 44B(4), p.409-421, 21 refs.

In a study of 5-day midtropospheric flow patterns for the South Pole during 1985-1989, cluster analysis was used to summarize trajectories by year and by month. The results indicate that flow from the east was most often anticyclonic and light, occurring 8-18% of the time. Westerly flow patterns were the strongest and most frequent (37-51% occurrence). They were consistently cyclonic, usually reflecting storms in the Ross Sea area. Strong northerly flow occurred more often in 1987 than in other years. Year-to-year variability was also evident in southwesterly flow, which was enhanced in 1988, and weaker in 1987, compared with other years. The lightest winds over the South Pole occur during Jan., while the most vigorous long-range transport to South Pole occurs from July through Oct. Isentropic trajectories from the east showed little vertical motion and good agreement with isobaric ones. Over west Antarctica, however, isentropic trajectories consistently showed positive vertical motion. As a result, their isobaric counterparts were too long, and thus overestimated the cyclonic curvature in the flow. Preferred transport from the west with warm-air advection results from the circumpolar vortex being asymmetrical, and the average isotherms, though roughly circular, being offset to the east of the South Pole. (Auth. mod.)

I-47253

Argentini, S., Mastrantonio, G., Fiocco, G., Ocone, R., **Complexity of the wind field as observed by a sodar system and by automatic weather stations on the Nansen Ice Sheet, Antarctica, during summer 1988-1989: two case studies,** *Tellus,* Sep. 1992 44B(4), p.422-429, 13 refs.

In the antarctic boundary layer, some phenomena appear to be particularly enhanced with respect to those at midlatitudes. Thermal stratifications are present almost all year and can sustain drainage flows of different types. Several episodes of flows with different potential temperature and consequently with different buoyancy were observed on the Nansen Ice Sheet by a sodar. Two case studies are presented in which a comparison with the data of the automatic weather stations located on the Reeves and the Priestley glaciers as well on the Nansen Ice Sheet have been used. Results show that during summer, the flow from the Reeves Glacier may superimpose the one from the Priestley. Also, an episode of barrier-katabatic flow interaction is shown in which the first is negatively buoyant in comparison with the second. The wind profile frequently shows increased variability with height. (Auth. mod.)

I-47254

Peel, D.A., Mulvaney, R., **Time-trends in the pattern of ocean-atmosphere exchange in an ice core from the Weddell Sea sector of Antarctica,** *Tellus,* Sep. 1992 44B(4), p.430-442, Refs. p.441-442.

The east coast of the Antarctic Peninsula is strongly influenced by air masses that have traversed the Weddell Sea zone. A continuous record of annual-average values for delta O-18, delta D, Cl and non sea-salt sulphate ion in snowfall deposited since 1975 has been obtained on an ice core drilled on Dolleman I. Chemical changes along the ice core seem to be linked to changes in the concentration of the ice cover in the marginal ice zone. In the period since 1956, these variations appear to be coupled to the atmospheric circulation, as indexed by the atmospheric pressure gradient across the marginal ice zone. The largest anomaly in the 200-year sequence occurs in the period 1820-1880, during the final stages of the Little Ice Age. During the past century, there has been a marked decrease in deuterium excess of about 4 per mill. The implication is that there may have been significant weakening of the ice cover in this zone during the past century, despite satellite evidence which reveals no significant change in the position of the ice edge, at least since 1973. (Auth. mod.)

I-47266

Gil, M., Cacho, J., **NO2 total column evolution during the 1989 Spring at Antarctic Peninsula,** *Journal of atmospheric chemistry,* Aug. 1992 15(2), p.187-200, 32 refs.

Ground-based visible differential absorption spectrometry during twilight has been used for NO2 total column observations at the Antarctic Peninsula, Marambio Base, during the austral spring of 1989. Results show moderate NO2 vertical column levels of 1.5 to 2.5 x 10(sup 15) molec/sq cm in the morning and 2 to 3 x 10(sup 15) molec/sq cm in the evening until middle October, highly modulated by planetary wave activity. From that date until the end of the period, a steady increase occurs which is associated with the rising of lower stratosphere temperature as the vortex weakens, reaching values of 5 x 10(sup 15) molec/sq cm in late November, with small a.m.-p.m. differences. NO2 is found to be positively correlated to both total ozone and 50 hPa temperature during the entire spring. However, when analyzing the departures from linear trends, a highly negative correlation has been observed from day 301 onwards. (Auth.)

I-47303

Deshler, T., **Volcanic aerosol and ozone depletion within the antarctic vortex during the austral spring of 1991,** *Geophysical research letters,* Sep. 23, 1992 19(18), p.1819-1822, 16 refs.

In the spring of 1991 the antarctic lower stratosphere was characterized by a layer of volcanic aerosol from the Cerro Hudson eruption. This aerosol layer was observed from McMurdo Station with both lidar and balloonborne particle counters beginning around Sep. 10. After Sep. 20 the aerosol was observed daily at between 9 and 13 km. In this layer homogeneous nucleation of new aerosol was observed with concentrations >6000/cu cm. Comparisons of scattering ratio calculated from measured particle size distributions agree best with the lidar measurements when a real index of refraction near 1.5 is used. In the past 5 years of measurements, ozone below 13 km has been relatively unchanged during the annual antarctic ozone depletion; however, in 1991 ozone below 13 km decreased at a rate of 4-8 ppb/day over 30 days. This change began shortly after the appearance of the volcanic aerosol, providing direct measurements correlating volcanic aerosol and ozone depletion. (Auth.)

I-47308

Joshi, P.V., **Distribution of atmospheric ions and Aitken nuclei over southern oceans and polar regions,** *Environment international,* 1992 18(4), p.417-425, 37 refs.

In the Eighth Indian Antarctic Expedition, measurements of atmospheric ions and Aitken nuclei were carried out over southern oceans and at an oasis in Antarctica. The levels decrease towards high latitudes and are log-normally distributed. Based on these data, some inferences have been made and background levels of both the species are described. Their dependence on background levels is discussed. At background levels, the inverse relationship between atmospheric ions and Aitken nuclei may not hold.

I-47311

Bromwich, D.H., Carrasco, J.F., Stearns, C.R., **Satellite observation of katabatic-wind propagation for great distances across the Ross Ice Shelf,** *Monthly weather review,* Sep. 1992 120(9), p.1940-1949, 23 refs.

Five winter months (Apr.-Aug. 1988) of thermal infrared satellite images were examined to investigate the occurrence of dark (warm) signatures across the Ross Ice Shelf. These features are inferred to be generated by katabatic winds that descend from southern Marie Byrd Land and then blow horizontally across the ice shelf. Significant mass is added to this airstream by katabatic winds blowing from the major glaciers that flow through the Transantarctic Mountains from East Antarctica. These negatively buoyant katabatic winds can reach the northwestern edge of the shelf, a horizontal propagation distance of up to 1000 km, 14% of the time. Where the airstream crosses from the ice shelf to the ice-covered Ross Sea, a prominent coastal polynya is formed. Because the downslope buoyancy force is near zero over the Ross Ice Shelf, the northwestward propagation of this katabatic air mass requires pressure gradient support. The study shows that the extended horizontal propagation of this atmospheric density current occurs in conjunction with the passage of synoptic cyclones over the southern Amundsen Sea. These cyclones can strengthen the pressure gradient in the interior of West Antarctica and make the pressure field favorable for northwestward movement of the katabatic winds from West Antarctica across the ice shelf in a geostrophic direction. The glacier winds from East Antarctica are further accelerated by the synoptic pressure gradient, usually undergo abrupt adjustment beyond the exit to the glacier valley, and merge into the mountain-parallel katabatic air mass. (Auth. mod.)

I-47350

Josefsson, W.A.P., **Focused sun observations using a Brewer ozone spectrophotometer,** *Journal of geophysical research,* Oct. 20, 1992 97(D14), p.15,813-15,817, 7 refs.

Accurate measurements of total ozone at high latitudes during winter have become increasingly important for studies of polar ozone depletion. The direct sun measurements are the most direct and physically well-defined type of measurement of total ozone with Dobson and Brewer spectrophotometers along with the focused sun measurements. The direct sun and focused sun method are influenced by many sources of error at low solar elevations. A large error arises from the addition of radiation scattered from air along the path of the solar beam. A method to correct for this error using the Brewer instrument is described. The method gives reasonably accurate values down to solar elevations of 5 deg, compared to 10-20 deg without corrections. This is especially important for high-latitude stations, where the low solar elevations are a limiting factor for accurate measurements of the total ozone, particularly during the winter. (Auth. mod.)

I-47358

Folkins, I., Brasseur, G., **Chemical mechanisms behind ozone depletion,** *Chemistry and industry,* Apr. 20, 1992 No.8, p.294-297, 13 refs.

The use of chlorofluorocarbons has diminished stratospheric ozone by 3% over the last 10 yr. The ozone layer is created as oxygen molecules absorb ultraviolet energy from the sun at altitudes of 15-40 km. The reaction is reversible, however, and lower energy levels of ultraviolet energy can cause the breakdown of the ozone molecule into an oxygen molecule and a free oxygen atom. The ozone breakdown can also cause chemical combination with other elements present in the stratosphere, such as nitrogen, hydrogen, and chlorine. A variety of chemical reactions involved in the breakdown of the ozone molecule are described, as are the consequences of a transparent atmosphere. Of principle concern is the effect of UV-B radiation on humans, crop yield, and phytoplankton.

I-47364

Leuenberger, M., Siegenthaler, U., **Ice-age atmospheric concentration of nitrous oxide from an antarctic ice core,** *Nature,* Dec. 3, 1992 360(6403), p.449-451, 33 refs.

Previous studies on polar ice cores showed that the concentrations of the greenhouse gases CO2 and CH4 were significantly reduced during the last glacial period relative to Holocene values. But no comparable studies have been reported for nitrous oxide (N2O), which is the next most important greenhouse gas and also affects stratospheric ozone and, potentially, the oxidative capacity of the troposphere. Reported here are results from antarctic ice cores, showing that the atmospheric N2O concentration was about 30% lower during the last glacial maximum than during the Holocene epoch. These data also show that present-day N2O concentrations are unprecedented in the past 45 kyr, and hence provide evidence that recent increases in atmospheric N2O are of anthropogenic origin. (Auth. mod.)

I-47374

Iwasaka, Y., Hirasawa, T., Fukunishi, H., **Lidar measurement on the antarctic stratospheric aerosol layer: 1. Winter enhancement,** *Journal of geomagnetism and geoelectricity,* 1985 37(12), p.1087-1095, 5 refs.

Measurements on polar stratospheric aerosol particles using lidar and meteorological sonde at Showa Station revealed that the content of stratospheric aerosols noticeably increased in winter when atmospheric temperature frequently fell down to about -80 C in the lower atmosphere, and that the depolarization ratio of the backscattered light from the enhanced stratospheric aerosols also has a very large value (at least larger than 0.5 during the fully developed enhancement period). (Auth.)

See also:
A-45882 A-46171 A-46842 B-45263 B-45570 B-45571 B-45607 B-45608 B-46225 B-46295 B-47053 B-47139 B-47200 B-47318 E-45106 E-45235 E-45269 E-45313 E-45393 E-45512 E-45548 E-45550 E-45551 E-45552 E-45598 E-45824 E-46038 E-46174 E-46442 E-46670 E-46994 E-47005 F-45087 F-45215 F-45351 F-45364 F-45456 F-45470 F-45518 F-45544 F-45566 F-45569 F-45636 F-45683 F-45684 F-45685 F-45686 F-45863 F-45919 F-45984 F-45995 F-46036 F-46039 F-46041 F-46042 F-46104 F-46256 F-46285 F-46393 F-46427 F-46429 F-46432 F-46434 F-46437 F-46438 F-46448 F-46449 F-46506 F-46558 F-46559 F-46596 F-46597 F-46648 F-46649 F-46650 F-46651 F-46652 F-46653 F-46654 F-46655 F-46657 F-46660 F-46661 F-46663 F-46664 F-46666 F-46667 F-46668 F-46688 F-46690 F-46712 F-46843 F-46844 F-46939 F-47222 F-47228 F-47229 F-47297 F-47316 F-47349 F-47357 G-45231 G-45233 G-45888 G-45956 G-45957 G-45958 G-45960 G-45970 G-45977 G-46065 G-46102 G-46140 G-46142 G-46672 G-46673 J-45200 J-45473 J-45568 J-45889 J-45895 J-45947 J-45991 J-46144 J-46209 J-46213 J-46357 J-46419 J-46457 J-46464 J-46691 J-46725 K-45065 K-45333 K-45391 K-45392 K-45979 K-46613 K-47176 K-47177

I -47243

Mulvaney, R., **Ratio of MSA to non-sea-salt sulphate in Antarctic Peninsula ice cores,** *Tellus,* Sep. 1992 44B(4), p.295-303, 21 refs.

Methane sulphonic acid (MSA) in an ice core from Dolleman I. shows significantly high concentrations compared to values recorded in ice cores and in snowfall from elsewhere in Antarctica. MSA data from two other higher altitude Antarctic Peninsula ice cores, Dyer Plateau and Gomez Nunatak, show that the high concentrations measured at Dolleman I. are not representative of the Peninsula region as a whole. Exceptionally high concentrations observed at Dolleman I. may be related to its proximity to the biologically productive Weddell Sea, an important source of dimethyl sulphide (DMS), the precursor of MSA. The MSA data from this site are also unusual in that in deeper sections of this core they demonstrate a well-defined seasonal maximum in winter rather than in summer, and are out of phase with non sea-salt sulphate, another product of the decomposition of DMS. In contrast, in a near-surface section, MSA variations are in phase with non sea-salt sulphate, with a maximum concentration in the summer layer. A change in the season of deposition of MSA from winter to summer in the recent past is not considered likely. An alternative explanation is that there has been a relocation of the MSA from summer to winter layers during burial. (Auth. mod.)

J. OCEANOGRAPHY

J-45072
Marotzke, J., Willebrand, J., **Multiple equilibria of the global thermohaline circulation,** *Journal of physical oceanography,* Sep. 1991 21(9), p.1372-1385, 40 refs.

A general circulation model with a highly idealized geometry is used to investigate which fundamentally different equilibria of the global thermohaline circulation may exist. The model comprises two identical basins representing the Atlantic and Pacific Oceans, which are connected by a circumpolar channel in the south. The model circulation is driven, in addition to wind forcing, by restoring the sea surface temperature to prescribed values and specified freshwater fluxes in the surface salinity budget (mixed boundary conditions). The boundary conditions are symmetric with respect to the equator and identical for both oceans. Four fundamentally different, stable steady states are found under the same set of boundary conditions. Two of the equilibria show both oceans in the same state, with high-latitude deep-water formation occurring either in both northern or in both southern oceans, respectively. Two additional equilibria exist in which the thermohaline circulations of the basins differ fundamentally from each other. One ocean forms deep water at northern high latitudes, while the other has a much weaker circulation with sinking in the Southern Hemisphere. One of these equilibria qualitatively corresponds to today's global thermohaline circulation pattern (conveyor belt). The study is centered on the Equator and data are presented for as far as 64 deg both north and south thereof. The two hemispheres are compared throughout at various parameters and states of equilibrium. (Auth. mod.)

J-45074
Stevens, D.P., **Open boundary condition in the United Kingdom fine-resolution antarctic model,** *Journal of physical oceanography,* Sep. 1991 21(9), p.1494-1499, 7 refs.

The United Kingdom Fine-Resolution Antarctic Model (FRAM project) is a community program to study the southern ocean. Central to this is an eddy-resolving three-dimensional primitive-equation ocean general circulation model. The open boundary condition at the northern boundary is described here. The boundary condition is based on that of Stevens (1990). (Auth.)

J-45075
Crowley, T.J., Baum, S.K., **Estimating Carboniferous sea-level fluctuations from Gondwanan ice extent,** *Geology,* Oct. 1991 19(10), p.975-977, 21 refs.

The magnitude of Carboniferous sea-level fluctuations is not well known, but the estimates are important for constraining cyclothem models. In this paper area-volume relations developed for Quaternary ice sheets are applied to estimate the glacio-eustatic component of sea-level fluctuations in the Carboniferous. By utilizing the best estimate of Gondwanan ice area at the time of its greatest extent, a figure of 60 m is estimated for the isostasy-corrected glacio-eustatic component. This value is nearer the lower limit of sea-level estimates for cyclothem fluctuations from other sources. Antarctic areas included in the study are shown in the figures and tables and are discussed in the text. (Auth. mod.)

J-45093
Bird, J., **Supercomputer voyages to the southern seas,** *Science,* Nov. 1, 1991 254(5032), p.656-657.

This news item provides a progress report on two research groups seeking to develop a model for the Antarctic Circumpolar Current and its interactions with other localized currents, particularly the Agulhas Current and the Gulf Stream. Of especial interest are the effects of these interactions on climates in other parts of the globe far removed from the points of interaction. The anticipated publication from these efforts is an atlas of ocean circulation. The most difficult problem at this stage is the unavailability of a computer sufficiently swift and powerful to afford expeditious handling of the data mass.

J-45121
Forbes, E.A., **Sea level observations at Artigas Station, King George I.** [Observaciones del nivel del mar frente a la Base Científica Antártica "Artigas" (Isla Rey Jorge)], Actas de la Primera Conferencia Latinoamericana sobre Geofísica, Geodesia e Investigación Espacial Antárticas. (First Latin American Conference on Antarctic Geophysics, Geodesy and Space Research, Buenos Aires, July 30-Aug. 3, 1990. Proceedings.) Edited by A. Louro, M.A. Van Zele, and I. Velasco, ⌜Buenos Aires, Centro Latinoamericano de Física, 1990⌝, p.72-80, In Spanish. 8 refs.

Tidal data collected in the vicinity of Artigas Station since Dec. 1987 are presented. Measuring instruments and methods used in the study are described. Results, including tides and sea water temperature and salinity, are discussed, illustrated and presented in tables. For Jan. 1988 the mean sea level is 6.5 cm. The tide is predominantly semidiurnal, although sometimes it is of the mixed type.

J-45154
Nicholls, K.W., Makinson, K., Robinson, A.V., **Ocean circulation beneath the Ronne ice shelf,** *Nature,* Nov. 21, 1991 354(6350), p.221-223, 16 refs.

Water modified by passage under ice shelves, particularly in the Weddell Sea, is believed to be an important constituent of Antarctic Bottom Water. Antarctic Bottom Water is both cold and oxygen-rich, and plays an important part in the cooling and ventilation of the world's oceans. Because of the difficulty in gaining access, the oceanographic regime beneath ice shelves is very poorly sampled. By successfully drilling through the ice, however, oceanographic data were obtained from beneath the largest antarctic ice shelf, the Ronne-Filchner ice shelf in the southern Weddell Sea. The authors' data agree well with the predictions of a relatively simple oceanographic plume model of sub-ice shelf circulation. This model can therefore be used with some confidence to investigate the links among climate changes, ice-shelf melting and bottom-water production. (Auth. mod.)

J-45156
Kock, K.H., **State of exploited fish stocks in the southern ocean—a review,** *Archiv für Fischereiwissenschaft,* Aug. 1991 41(1), p.1-66, With German summary. 54 refs.

Antarctic finfish resources have been subject to exploitation primarily by the Soviet Union for more than 20 years. The total yield from the southern ocean has been 2.85 million tonnes until the season 1989/90. About two thirds of the catches have been taken in the Atlantic Ocean sector (mainly South Georgia) while the remaining one third originated primarily from the Kerguelen waters in the Indian Ocean sector. The fishery has been regulated under the auspices of CCAMLR for the whole southern ocean since 1982, and under

French national jurisdiction around the Kerguelen and the Crozet Is. Apart from the lanternfish *Electrona carlsbergi,* the fishery on all other species is restricted by conservation measures. The stocks most heavily affected by fishing are those of *Notothenia rossii* in both sectors, *Notothenia squamifrons* in the Indian Ocean sector and of *Champsocephalus gunnari* in the South Orkney Islands/Antarctic Peninsula region. Most of these stocks are now only small fractions of their initial sizes. *C. gunnari* around South Georgia has recovered two times from low stock sizes following heavy fishing. (Auth.)

J-45158
Brun-Cottan, J.C., Auger, R., Lambert, C.E., Chesselet, R., **Sources and transport of suspended calcites in Pacific Deep Water,** *Journal of marine research,* Aug. 1991 49(3), p.543-564, Refs. p.562-564.

Significantly large concentrations of suspended matter, especially calcites, are found at some locations in the Deep Pacific, particularly at the depth of the Pacific Benthic Thermocline. These particle-rich layers cannot be explained by simple classical settling processes nor by resuspension of the underlying sediment. A theoretical approach based on these data, on the hydrodynamic characteristics of the regional circulation and on some known physical and chemical parameters, leads the authors to postulate two possible mechanisms: the settling of large particles from surface waters and their preferential disaggregation at some specific depth, particularly at the Pacific Benthic Thermocline depth; or alternatively, the resuspension at those depths of old calcareous sediments from the flanks of East Pacific Rise associated with a horizontal advective diffusive transport mechanism. New chemical and electron-microscope analyses of GEOSECS samples lead to the conclusion that the resuspension mechanism is the most probable. (Auth. mod.)

J-45186
Ventajas, L., **Relationship between polynucleate hydrocarbon concentration profiles and submarine subsoil** [Relación entre los perfiles de concentración de hidrocarburos polinucleados y subsuelo submarino], *Buenos Aires. Instituto Antártico Argentino. Contribución,* 1991 No.385, p.13-33, In Spanish with English, French and German summaries. 5 refs.

A study of polynucleate hydrocarbon concentration profiles versus sea depth was conducted in water samples obtained at 30 different locations in 1984-1986. In the proximity of Marambio Station and in the Bransfield Strait, the graphs of polynucleate hydrocarbon concentration versus time at different depths show greater concentration values in shallow and in deep waters than in intermediate layers. Two sedimentary basins with possible hydrocarbon deposits are situated in these zones. In the Bellingshausen Sea area, the graphs of concentration versus depth don't show any special characteristic, either in surface water or in deeper layers. Since the presence of hydrocarbon deposits in this area is unlikely, it is concluded that a parallel exists between the high polynucleate hydrocarbon concentrations in surface and deep waters and the possible presence of sedimentary basins. (Auth. mod.)

J-45187
Ventajas, L., **Diffusion difference between warm and cold waters** [Diferencia de difusión entre aguas cálidas y aguas frías], *Buenos Aires. Instituto Antártico Argentino. Contribución,* 1991 No.386, p.35-56, In Spanish with English, French and German summaries. 3 refs.

The study of vertical diffusion of polynucleate hydrocarbons, spilled by the bilge of the icebreaker *Almirante Irizar* in 3 Argentine ports and in the vicinity of 2 antarctic stations, is discussed. Analysis of curves of concentration versus time shows a variation at depths of 60-120 cm at all sites. However, in Antarctica no variations are observed during the first few hours, suggesting a slower diffusion of the hydrocarbons in colder water.

J-45188
Ventajas, L., **Polynucleate hydrocarbons in antarctic water and sediments** [Hidrocarburos polinucleados en sedimentos y en aguas antárticas], *Buenos Aires. Instituto Antártico Argentino. Contribución,* 1991 No.387, p.57-71, In Spanish with English, French and German summaries. 4 refs.

Samples of surface sediments from the sea floor in the vicinity of Marambio, Jubany and San Martín Stations were analyzed for polynucleate hydrocarbon contents. The highest concentrations of these compounds were found in the Marambio Station samples, both of sea water at various depths and of the bottom sediments. Concentrations are found to be comparable to those found in the contaminated offshore zones of arctic seas.

J-45189
Ventajas, L., **Polynucleate hydrocarbons in frozen and contaminated sea water and in antarctic waters at two different depths** [Hidrocarburos polinucleados en agua de mar congelada y contaminada y en aguas antárticas en dos profundidades], *Buenos Aires. Instituto Antártico Argentino. Contribución,* 1991 No.388, p.73-87, In Spanish with English, French and German summaries. 3 refs.

Containers with samples of sea water to which increasing quantities of petroleum were added were partly frozen, for equal periods of time and in vitro. It was found that the concentration of polynucleate hydrocarbons increased in water as well as in ice, suggesting that the diffusion phenomenon is enhanced by the polynucleate concentration. Samples of sea water to which equal quantities of petroleum were added were frozen in part for different periods of time and in vitro, showing the following: at first, the polynucleate hydrocarbon concentration in frozen water increases, remaining constant later because ice forms from surface water containing the suspended hydrocarbons. When these decrease enough, ice forms from the deeper water containing a minimum quantity of polynucleate hydrocarbons in solution. Analysis of sea water samples 0.5 m in depth showed higher concentration of hydrocarbons than that found in deeper water, which is attributed to the dense suspension of hydrocarbons in the air. (Auth. mod.)

J-45200
Klinck, J.M., **Vorticity dynamics of seasonal variations of the Antarctic Circumpolar Current from a modeling study,** *Journal of physical oceanography,* Oct. 1991 21(10), p.1515-1533, 31 refs.

A one-layer numerical model was developed to analyze the vorticity dynamics of the seasonal variations of currents in the southern ocean. The model includes the continental geometry and bathymetry of the southern ocean and is forced by monthly climatological wind stress. Five cases are considered that compare circulation over a flat bottom to that with bathymetry, effects of zonally averaged wind stress forcing versus the climatological forcing, and anomaly wind stress versus the full stress. The individual terms in the vorticity conservation equation are calculated from the model solution along two latitude lines; 57.5S and 43.5S. In the zonal part of the flat bottom simulation, the curl of the surface stress balances bottom stress curl. However, in Drake Passage, *beta* balances bottom loss. Such vorticity interactions depend on the partial barrier of South America, and thus do not occur in zonal channel models. The removal of vorticity occurs throughout the southern ocean for the seasonally varying winds, but the mean circulation is balanced mainly by losses near

Drake Passage. The location of the Antarctic Circumpolar Current is controlled by the tip of South America rather than the structure of the wind. The seasonal changes in the model surface elevation in Drake Passage occur largely in the southern part of the passage, in agreement with pressure observations. Bottom topography changes the vorticity interactions so that the largest effects occur where the flow is forced over bathymetry, creating relative vorticity by stretching, which is then removed by bottom friction. (Auth. mod.)

J-45226

Hellmer, H.H., Olbers, D.J., **On the thermohaline circulation beneath the Filchner-Ronne ice shelves,** *Antarctic science,* Dec. 1991 3(4), p.433-442, 26 refs.

The Weddell Sea oceanographic data and numerical models demonstrate that Ice Shelf Water, one ingredient in the production of Weddell Sea Bottom Water, is formed by thermohaline interaction of High Salinity Shelf Water with the base of the Filchner-Ronne ice shelves. South of Berkner I. a passage with a water column thickness of about 300 m linking the Filchner and the Ronne regimes is important for the ventilation of the sub-ice shelf cavities. To simulate the flow, a two-dimensional thermohaline circulation model was tested on several sections which approximate different geometries of a sub-ice shelf channel bounded by the ocean bottom and the ice shelf base. Temperature and salinity profiles measured in front of the Filchner-Ronne ice shelves are used to force the model. The results indicate that the circulation is sensitive to both salinity (density) forcing and depth of the shelf bottom prescribed at the open boundary representing the Ronne Ice Shelf edge. Where the shelf is shallow (400 m deep), a closed circulation cell within the Ronne cavity acts like an ice pump with accumulation rates of marine ice at the ice shelf base up to 1.5 m/y. The total outflow at the Ronne Ice Shelf edge is supported by an inflow from the Filchner regime. Where the shelf is deeper, a flow from the Ronne into the Filchner cavity develops if the bottom salinity at the Ronne Ice Shelf edge exceeds a critical value of 34.67. Seasonal variability imposed at both edges modifies the circulation pattern at the Filchner Ice Shelf edge such that the depth and magnitude of Ice Shelf Water outflow correspond with observations in the Filchner Depression. (Auth.)

J-45245

Voĭonov, G.N., Uranov, E.N., **Sea level tidal oscillations in the shelf area of Russkaya Station** [Prilivnye kolebaniia urovnia v shel’fovoĭ zone u stantsii Russkoĭ], *Sovetskaia antarkticheskaia ekspeditsiia. Trudy,* 1990 Vol.89, p.67-71, In Russian. 5 refs.

Prolonged measurements of sea level oscillations, obtained in the Ross Sea in 1985 and 1986, are discussed. Results of the harmonic analysis of monthly and bimonthly data, carried out by the Doodson method in the former, and the method of least squares in the latter, are presented. The hypothesis is advanced of the presence of amphidromic semi-diurnal M2 and S2 waves in the Cape Berks region.

J-45264

Pochivalov, A.IU., Snopkov, V.G., **Heat storage in the active layer of the world ocean,** *Oceanology,* Feb. 1990 (Pub. Aug. 90) 30(1), p.18-24, 7 refs. For Russian original see 18J-42412.

Heat storage in the active layer (0-200 m) of the world ocean is estimated for each season using data from the Climatological Atlas of the World Ocean (NOAA). The contribution of each layer to the total heat storage, and its annual variation, are determined as follows: in all oceans, except the Indian Ocean, in the upper 50 m layer the maximum heat storage occurs in the fall; in the 150-200 m layer of the world ocean it occurs in winter. Results are presented on tables and maps. (Auth. mod.)

J-45265

Belkin, I.M., Romanov, IU.A., **Surface contents and temperature fronts of the southern Indian Ocean,** *Oceanology,* Feb. 1990 (Publ. Aug. 90) 30(1), p.25-28, 8 refs. For Russian original see 18J-42413.

Thermal and kinematic signatures of the subtropical and the subantarctic fronts north of the Kerguelen Plateau were studied during two cruises of the R/V *Vitiaz’* in Jan.-Feb. 1983, and in Apr. 1987. Both fronts were associated with the eastward current jets. Results are discussed and presented in tables. (Auth. mod.)

J-45319

Hong, G.H., Kim, D.Y., Chung, H., Pae, S., **Coastal and inshore water interaction, mixing and primary productivity in the Bransfield Strait, Antarctica during austral summer 1989/90,** *Korean journal of polar research,* June 1991 2(1) (Special issue), Second International Symposium on Antarctic Science, Seoul, Korea, Sep. 17-18, 1990. [Proceedings], p.43-59, Refs. p.57-59.

Nutrients and chlorophyll *a* were collected along with CTD data in the Bransfield Strait proper and in Maxwell Bay during Dec. 29, 1989-Jan. 9, 1990. Inshore waters of Maxwell Bay and Marian Cove are diluted by the freshwater input provided by the nutrient-depleted glacial melting and surface runoff. Nutrients and organic matter appear to be imported from the Bransfield Strait to the inshore waters by tidal activity. Phytoplankton biomass (chl *s)* and water column stability (the surface mixed layer depth) were positively correlated in the southeast Pacific basin water mass. Results present clear evidence that phytoplankton growth in the Antarctic may be hindered by the water column instability, since the water column hydrography in the Bransfield Strait shows that the well-defined surface mixed layer is not fully developed but rather continuously stratified. This may partly explain the relatively poor productivity, despite high nutrient level, of the antarctic marine ecosystems. (Auth. mod.)

J-45320

Gudoshnikov, IU.P., Dogonov, A.P., Gorshkov, A.N., Smagin, V.M., **Main features of water chemical structure in the southern ocean,** *Korean journal of polar research,* June 1991 2(1) (Special issue), Second International Symposium on Antarctic Science, Seoul, Korea, Sep. 17-18, 1990. [Proceedings], p.61-67.

To better understand water stratification, the authors describe chemical element redistribution due to dynamic processes, trends and intensity of biochemical synthesis processes and organic matter distribution in the southern ocean, the distributions of major hydrochemical parameters, such as dissolved oxygen, dissolved phosphates, pH values and total alkalinity. A set of data on each element were averaged into rectangular grid points to construct maps of the spatial distributions of hydrochemical parameters. (Auth.)

J-45330

Hahn, S.D., **Meridional changes of sea surface temperature along 135E of the southern ocean,** *Korean journal of polar research,* June 1991 2(1) (Special issue), Second International Symposium on Antarctic Science, Seoul, Korea, Sep. 17-18, 1990. [Proceedings], p.189-192, 3 refs.

Based on monthly mean sea surface temperature (SST) observations during 7 years (1979-1985), the SST meridional effect was studied. Three variables were given as functions of southern latitude between 35S and 65S. They show linearly decreasing tendencies with increasing latitude. Decreasing rates per southern latitude, in degrees, are 0.11 C for annual SST range, 0.56 C for annual mean SST, and 2.8 kcal/sq cm/yr for radiation balance, respectively. (Auth.)

J-45331

Forbes, E.A., **Sea-level observation in the antarctic region by the Republica Oriental del Uruguay. 2. Harmonic analysis,** *Korean journal of polar research,* June 1991 2(1) (Special issue), Second International Symposium on Antarctic Science, Seoul, Korea, Sep. 17-18, 1990. [Proceedings], p.193-195, 5 refs.

A program of tidal observations has been carried out during the summer seasons at Artigas Station, since 1987. The observation period covers Dec. 12, 1987-Feb. 9, 1988; Dec. 28, 1988-Feb. 23, 1989; and Feb. 15-Mar. 15, 1990. Harmonic analysis was applied to the first and second tidal series, and the weighted average for each harmonic constant was obtained. Results are presented in tables and charts.

J-45341

Kuvaas, B., Kristoffersen, Y., **Crary Fan: a trough-mouth fan on the Weddell Sea continental margin, Antarctica,** *Marine geology,* Apr. 1991 97(3/4), p.345-362, 39 refs.

Multichannel seismic investigations show the presence of a large trough-mouth fan deposit on the continental margin in the southern Weddell Sea. A characteristic feature of the fan is relatively few, but large canyons and/or channels which appear to have been stable for long periods. Levees associated with the channels may reach thicknesses of more than 1 km. Drilling during ODP Leg 113 recorded the presence of glaciers in East Antarctica since early Oligocene time, and the seismic stratigraphic evidence suggests that the submarine fan is largely composed of glacigenic sediments. The channel-levee systems and complexes indicate several growth phases, apparently controlled by glacial/interglacial climate fluctuations, with maximum fan growth during glacial periods. The present interglacial period is characterized by strong and erosive flow of Ice Shelf Water running down the western slope of the fan and carrying only minor amounts of suspended matter. The fan is essentially sediment starved during interglacial periods. The dimensions of the channel-levee complexes and the persistent loci of sediment supply suggest that turbidite sedimentation resulted from melting of wet-based glaciers at or near the shelf edge, which has consequently prograded 70-80 km seaward. (Auth.)

J-45365

Grumbine, R.W., **Model of the formation of high-salinity shelf water on polar continental shelves,** *Journal of geophysical research,* Dec. 15, 1991 96(C12), p.22,049-22,062, 39 refs.

A model of the flow and salinity fields forced by sea surface salinity flux and wind stress curl is developed and used to examine the processes that create High-Salinity Shelf Water (HSSW). The flow field is the sum of the baroclinic geostrophic flow driven by salinity variations and a barotropic geostrophic flow driven by wind stress curl. The salinity field is controlled by advection, convection, and sea surface salinity flux associated with sea ice formation. The model domain represents the Weddell Sea or Ross Sea continental shelf without topography. Ekman pumping was seen to control the magnitude of the circulation, while the polynya freezing rate controlled the extent of salinization in the shelf water. The flux of HSSW is linear with respect to the polynya freezing rate. The modelled flux of HSSW and the flux of derived Bottom Water for present estimates of the forcings agree with the fluxes inferred from physical and chemical observations in the deep Weddell Sea by oceanographic field programs. The modelled flux of Bottom Water for the Ross Sea also agrees with observations. (Auth. mod.)

J-45370

Kliausov, A.V., **Position of the South Polar Front near Kerguelen and Heard Islands in the autumn of 1987,** *Oceanology,* Oct. 1990 30(2), p.142-148, Translated from Okeanologiia. 23 refs.

Oceanographic survey data obtained by AzCherNIRO are used to analyze the anomalous southward displacement of the South Polar Front near Kerguelen and Heard Is. in Mar.-June 1987. This displacement probably occurred in late 1986 and had a considerable effect on the condition of the plankton community and the fish productivity of waters near the Kerguelen Is. (Auth.)

J-45373

Jenkins, A., **One-dimensional model of ice shelf-ocean interaction,** *Journal of geophysical research,* Nov. 15, 1991 96(C11), p.20,671-20,677, 38 refs.

Large-scale oceanic circulation beneath antarctic ice shelves is driven by the thermohaline differences which result from mass and energy exchange at the ice-ocean interface. Dense saline waters are drawn underneath the ice shelves and emerge, cooled and diluted, as plumes of Ice Shelf Water. A simple one-dimensional model of this process has been developed, in which the Ice Shelf Water plume is treated as a turbulent gravity current, initiated at the inland margin by a flow of fresh meltwater emerging from beneath the grounded ice. Subsequent evolution of the plume as it ascends along an ice shelf base of specified geometry can be simulated. The model has been applied to a flow line on Ronne Ice Shelf to explain the observed distribution and rate of basal melting and freezing. Calculations indicate that the present mean melt rate of 0.6 m/y would increase to 2.6 m/y if the underlying water were to warm by 0.6 C. This would not only lead to significant thinning of the ice shelf but could also cause a profound change in ocean circulation on the open continental shelf. (Auth. mod.)

J-45383

Lutjeharms, J.R.E., Webb, D.J., de Cuevas, B.A., **Applying the Fine Resolution Antarctic Model (FRAM) to the ocean circulation around southern Africa,** *South African journal of science,* Aug. 1991 87(8), p.346-349, 29 refs.

FRAM, the circulation model that lays claim to simulating the processes in the ocean with a verisimilitude to nature, is described. It is one of the largest and most detailed computer models of the ocean ever constructed. It covers the full ocean area south of 24S, and uses a grid with a resolution of 1/4 deg. in the north-south direction and 1/2 deg east-west. The model has 32 horizontal levels spaced at increasing intervals with depth, down to the deepest level of 5,500 m. The variables stored in the model are temperature, salinity and velocity. The topics being studied at present with the model include the physical processes controlling the Antarctic Circumpolar Current, the transport of potential vorticity, the heat transport of the southern ocean, the formation and transport of different water types by the Circumpolar Current, as well as the formation and influence of pack ice.

J-45396

Lipski, M., Rakusa-Suszczewski, S., **Early summer pattern of vertical distribution of chlorophyll *a* (Bransfield Strait, Antarctica, November 1986),** *Polskie archiwum hydrobiologii,* 1990 (Publ. May 91) 37(3), p.287-293, 21 refs.

During Nov. 1986 chlorophyll *a* levels were determined at 17 oceanographic stations located in the Bransfield Strait. The results point to substantial concentrations of chlorophyll *a* below the euphotic zone, even at 400-500 m depths when the stability of the water column is very low. Chlorophyll *a* content calculated for the entire water column can be 8 times higher than the content in the euphotic zone.

Therefore, routine procedures for estimation of the standing crop of phytoplankton may lead to considerable underestimation. (Auth.)

J-45407

Tréguer, P., **Production of biogenic silica in the Weddell-Scotia Seas measured with Si-32,** *Limnology and oceanography,* Sep. 1991 36(6), p.1217-1227, 16 refs.

During leg 2, Nov. 1988-Jan. 1989, of the European *Polarstern* study (EPOS) in the Weddell-Scotia Confluence zone, a new method was implemented based on Si-32, a *beta*-emitter in equilibrium with P-32, to determine biogenic silica (BSi) production. This method provides simultaneous determination of the production of organic P. Rates of BSi production ranged from 0.09 to 0.95 mmol Si/sq m/h, and the BSi content of the photic layer ranged from 7 to 220 mmol/sq m. The Si:C production molar ratios varied between 0.08 and 0.81, while the C:P production ratios varied between 47 and 151 with an average of 105, in agreement with the Redfield ratio. Given here is the first direct evidence that in the well-mixed waters of the Scotia Sea highly silicified diatom blooms may occur, and that unlike earlier descriptions, because of the intense grazing pressure of krill in the marginal ice zone (MIZ) of the Weddell Sea, the remaining siliceous phytoplankton can grow with only moderate Si production rates. It is concluded that the contribution of the MIZ to the total BSi production of the southern ocean must not be overstated. (Auth. mod.)

J-45408

Wei, W.C., **Middle Eocene-lower Miocene calcareous nannofossil magnetobiochronology of ODP Holes 699A and 703A in the subantarctic South Atlantic,** *Marine micropaleontology,* Nov. 1991 18(1/2), p.143-165, 50 refs.

The distribution of calcareous nannofossils is documented for the middle Eocene through lowermost Miocene cores from Ocean Drilling Program Holes 699A and 703A in the subantarctic South Atlantic. The detailed nannofossil biostratigraphies established, in combination with published magnetostratigraphic data, have provided a fairly detailed age model for each hole. This study suggests that the middle Eocene through lowermost Miocene section from Hole 699A is virtually complete. A major hiatus has been identified in Hole 703A in the earliest Oligocene, coincident with an abrupt cooling in the southern ocean. Comparison of the nannofossil datum ages calibrated with magnetostratigraphy in the two holes with those from mid- and southern high latitudes demonstrates synchroneity or diachroneity for the following nannofossil datums which have last occurrence (LO) ages ranging from 26.8 Ma to 36.0 Ma and first occurrence (FO) ages ranging from 38.4 Ma to 39.0 Ma: LO *Reticulofenestra bisecta, Chiasmolithus altus, R. umbilica, Isthmolithus recurvus, R. oamaruensis;* FO *R. oamaruensis,* and *I. recurvus.* (Auth. mod.)

J-45436

Everson, I., Campbell, S., **Areas of seabed within selected depth ranges in CCAMLR Subarea 48.3, South Georgia,** Scientific Committee for the Conservation of Antarctic Marine Living Resources. Selected scientific papers 1990, Hobart, Tasmania, CCAMLR, 1991, p.459-466, 1 ref.

Areas of seabed within 50 m depth contours down to 250 m, between 250 and 500 m and deeper than 500 m have been estimated from nautical charts. The results are presented by CCAMLR fine-scale reporting areas. (Auth.)

J-45473

Jansen, E., **Deglaciation, impact on ocean circulation,** Encyclopedia of earth system science, Vol.2. Edited by W.A. Nierenberg, San Diego, Academic Press, 1991, p.35-46, 16 refs.

The climate system responds in a nonlinear fashion to the climatic forcing imposed by increased insolation during deglaciations. The ocean is an important factor for determining this response. To understand the way climate changed during these transitions, it is necessary to understand the role of the oceans,including Antarctic Bottom Water, as a mediator of both gradual and abrupt climate change. (Auth.-mod.)

J-45475

Olson, D.B., **Ocean circulation,** Encyclopedia of earth system science, Vol.3. Edited by W.A. Nierenberg, San Diego, Academic Press, 1991, p.367-382 + 5 leaves, 5 refs.

Flows in the ocean at scales larger than 100 km make up vast patterns referred to as the ocean's circulation. The near-surface circulation is driven primarily by the wind and is divided into closed circulations known as gyres by the existence of continental boundaries. An exception to this is the Antarctic Circumpolar Current, which forms a flow around the globe at about 55S. In the deeper ocean there is a global pattern to the flow, with dense waters formed in the Atlantic Ocean and around Antarctica producing a relatively slow set of flows into the Indian Ocean and the Pacific Ocean. There is a return of surface waters back into the Atlantic to complete this thermohaline circulation. (Auth. mod.)

J-45489

Botz, R., Bohrmann, G., **Low-temperature opal-CT precipitation in antarctic deep-sea sediments: evidence from oxygen isotopes,** *Earth and planetary science letters,* Dec. 1991 107(3/4), p.612-617, 30 refs.

Porcellanite has been found in antarctic deep-sea sediments of shallow burial depth at four different sites in host sediments younger than 4 Ma. Oxygen isotope analysis shows that the opal- CT samples are extremely rich in 18-O. According to the quartz/water fractionation the calculated isotopic opal-CT formation temperature is in the range of 0 to 4C. This agrees well with sediment temperature measurements. The low opal-CT precipitation temperature contrasts with current ideas about later diagenetic formation of opal-CT at higher temperatures of 18 to 56C (Auth.)

J-45509

Foldvik, A., **Oceanographic research during NARE-84/85,** Filchner-Ronne Ice Shelf programme, Report 3 (1986), compiled by H. Kohnen, Bremerhaven, Alfred Wegener Institute for Polar and Marine Research, 1986, p.107-109.

DLC G890.F55R47

The physical oceanography work during NARE-1984/85 was a follow-up of previous work in the Weddell Sea. In particular the work was centered on further investigations of the flow of Ice Shelf water out of the Filchner Depression which was discovered during NARE-76/77. One year of currentmeter moorings showed that this flow of supercooled water most probably represents a major contribution to the process of bottom water formation: the volume leaving the shelf break is about 10 times the volume flux of the Amazon River. The temperature is below -1.9 C.

J-45537

Jacobs, S.S., **On the nature and significance of the Antarctic Slope Front,** *Marine chemistry,* Nov. 1991 35(1-4), p.9-24, 46 refs.

The region near the edge of the continental shelf around Antarctica is the primary site for renewal of antarctic surface waters and the deepest layers of the World Ocean. Here the Circumpolar Deep Water (CDW) reservoir approaches the sea surface and is transformed into a variety of surface, slope and shelf waters. It is the locus of enhanced exchange of heat, salt, gases and freshwater between the ocean, atmosphere, sea ice and glacial ice, and of nutrient and particulate material transport on and off the continental shelf. Rejuvenated near-surface waters here mix back into the deep ocean to modify the CDW and form Antarctic Bottom Water. The Antarctic Slope Front is a common oceanographic feature near the shelf break and has a major bearing on these processes. This topographically controlled front is marked by strong subsurface gradients in ocean temperature and chemistry, and by stronger alongshore currents than most of the adjacent continental shelf. It is one of the preferred routes for icebergs moving westward along the continental margin, and is characterized by regionally lower winter sea ice cover. There is significant evidence for regionally higher biological productivity along the Antarctic Slope Front. (Auth.)

J-45568
Drewry, D.J., **Response of the antarctic ice sheet to climatic change,** Antarctica and global climatic change, edited by C.M. Harris and B. Stonehouse, London, Boca Raton, FL, Bellhaven Press, Lewis Publishers, 1991, p.90-106, 41 refs.

A central issue in sea level predictions is to determine better the sign and magnitude of antarctic ice volume changes and their timescales. In the short term the increase in precipitation over the ice sheet will be the principal response to a warming climate, and this effect is already observed. On the basis that the net accumulation over Antarctica is of the order of 2200 Gt/yr, a conservative increase in precipitation of 0.5% per year, as suggested from the Antarctic Peninsula and the results from East Antarctica, would lower sea level by approximately 0.03 mm/yr. Alternatively, the same lowering could be expressed as resulting from an average atmospheric temperature change over Antarctica of +2-3 C per decade. In the longer term, over the next 500 years or more, ice flow will adjust to enhanced ocean and atmospheric warming, with an increase in the discharge of ice stored on the continent to the sea. Initially this is predicted to occur through a thinning and retreat of ice shelves and ice streams, with possible consequent drawdown of ice in the interior of West Antarctica. Although rates are not known and available glaciological models are still primitive, some studies show that sea level rise could be of the order of 2 mm/yr once this process has been initiated.

J-45594
Forbes, A.M.G., Speer, K.G., **Western boundary current of the eastern flank of the Kerguelen Plateau,** 1991-1992 Australian Antarctic Research Program. Antarctic Treaty exchange information: Supplement A to particulars for ANARE, Kingston, Tasmania, 1991, p.237-240, 1 ref.

A project is proposed to carry out the first section of closely spaced hydrographic stations to be made across the eastern flank of the Kerguelen Plateau; to identify the northward flow of deep water expected from theory and suggested by historical data; and to measure the strength of the flow to determine its role in the world ocean circulation with respect to mass and heat transport.

J-45595
McMeekin, T.A., Nichols, P.D., Burton, H.R., **Estimation of the abundance and spatial distribution of *Phaeocystis pouchetii* in southern ocean and near-shore antarctic waters, using signature lipids and pigments,** 1991-1992 Australian Antarctic Research Program. Antarctic Treaty exchange information: Supplement A to particulars for ANARE, Kingston, Tasmania, 1991, p.245-248, 19 refs.

A project is proposed to use signatures developed for the prymnesiophyte alga *Phaeocystis pouchetii* for estimating the abundance and spatial distribution of this important alga in antarctic climate, food-web and environmental studies; to determine the effect of increased levels of UV-B on the lipid and pigment composition of *P. pouchetii;* to extend current knowledge of the biology, biochemistry and ecology of coastal antarctic plankton communities through signature-lipid analysis of these communities during the austral summer; to provide baseline data on the distribution and abundance of hydrocarbons and other lipids in particulate matter and sediments at Davis Station, which will include field-based degradation studies of petroleum-derived hydrocarbons; and to gain insight into the origin of prymnesiophyte and other algal-derived lipids in crude oils, and to comment on rates of accumulation of these lipids in antarctic marine sediments.

J-45596
Rintoul, S.R., **Australian southern ocean WOCE hydrographic program,** 1991-1992 Australian Antarctic Research Program. Antarctic Treaty exchange information: Supplement A to particulars for ANARE, Kingston, Tasmania, 1991, p.254-258.

The primary scientific objectives of the proposed project are: to estimate the interbasin exchange of heat, freshwater and other properties south of Australia, and the seasonal and interannual variability in this exchange; to investigate the mechanisms responsible for the formation of deep and intermediate water masses in the southern ocean, and to identify the ventilation pathways newly formed water masses follow into the ocean interior; and to determine the importance of eddy heat and momentum fluxes in the dynamics and thermodynamics of the Antarctic Circumpolar Current south of Australia.

J-45599
Ou, H.W., **Some effects of a seamount on oceanic flows,** *Journal of physical oceanography,* Dec. 1991 21(12), p.1835-1845, 19 refs.

This paper demonstrates some effects of a seamount on oceanic flows through consideration of a uniform, two-layer flow passing a right circular cylinder of arbitrary height in a rotating fluid. In the case of vanishing stratification, previous results of low obstacles to an obstacle of finite height are first generalized, and employed to show how the frictional regime provides a transition from partial to total blocking as the obstacle top approaches the surface. In the case of general stratification, various dynamical regimes according to blockage of the flows, characterized by distinctive interface signatures were discerned. By generalizing the model results to a multiple-layer fluid, mesoscale features similar to those observed over the Emperor Seamounts have been deduced. When the model is applied to the Maude Rise in the Weddell Sea, it can explain the extensive ventilation of the water above the rise, with possible implications on the initiation and maintenance of the Weddell polynya. (Auth. mod.)

J-45688
Charles, C.D., Fairbanks, R.G., **Evidence from southern ocean sediments for the effect of North Atlantic deep-water flux on climate,** *Nature,* Jan. 30, 1992 355(6359), p.416-419, 38 refs.

The southern ocean is perhaps the only region where fluctuations in the global influence of North Atlantic Deep Water (NADW) can be monitored unambiguously in single deep-sea cores. A carbon isotope record from benthic foraminifera in a southern ocean core reveals large and rapid changes in the flux of NADW during the last deglaciation, and an abrupt increase in the NADW production rate which immediately preceded large-scale melting of the Northern Hemisphere ice sheets. This sudden strengthening of the NADW thermohaline cell provides strong evidence for the importance of NADW in glacial-interglacial climate change. (Auth.)

J-45692
Jamous, D., **Distribution of helium-3 in the deep western and southern Indian Ocean,** *Journal of geophysical research,* Feb. 15, 1992 97(C2), p.2243-2250, 37 refs.

New deep He-3 data from the INDIGO program give further insight into the distribution of this tracer in the Indian Ocean. This distribution exhibits some major features related both to a hydrothermal He-3 input in the Gulf of Aden and on the Mid-Indian Ocean Ridge and to the origin of the water masses and to the characteristics of the deep circulation. The main pattern is a significant north-south He-3 gradient, with deep waters of the southern ocean showing (delta) He-3 values around 8-9% due to the influence of the Atlantic deep waters poor in He-3, and relatively high values in the northern and central regions originating from the hydrothermal activity. In the easternmost part of the basin, the He-3 values exhibit a significant increase at shallower depths (around 1000 m) probably due to the Pacific water flow through the Indonesian sills, whereas the data in the Indian sector of the antarctic ocean show a maximum of the order of 10%, south of the Polar Current. These different aspects are summarized by mapping the horizontal distribution of the (delta) He-3 maxima all over the Indian basin. This map points out some characteristics of the deep circulation but also stresses the need for further measurements in order to clarify the description of this tracer in several key areas. (Auth. mod.)

J-45716

Kamenkovich, V.M., ed, **World Ocean experiment; USSR participation in the World Ocean Circulation Experiment (WOCE)** [Global'nyĭ eksperiment po tsirkuliatsii okeana; programma uchastiia SSSR v global'nom eksperimente po tsirkuliatsii okeana (VOSE)], Moscow, Mezhduvedomstvennyĭ geofizicheskiĭ komitet, AN SSSR, 1990, 131p. (Pertinent p.37-52,107-124,131), In Russian with English table of contents. Refs. passim.

Descriptions of the international World Ocean Circulation Experiment program and the Soviet programs and institutes investigating general ocean circulation are presented. Pertinent topics include: structure, variability, and dynamics of the Antarctic Circumpolar Current waters; ocean-atmosphere interaction, the formation of water masses, and the role of ice in these processes; and meridional heat and salinity transfer.

J-45725

Sept, V.V., **Autooscillations of the thermohaline circulation with asymmetric ocean distribution in northern and southern hemispheres,** *Akademiia nauk SSSR. Izvestiya. Atmospheric and oceanic physics,* Nov. 1990(Pub. June 91) 26(11), p.865-870, 5 refs. Translated from Akademiia nauk SSSR. Izvestiia. Fizika atmosfery i okeana.

The evolution of the thermohaline ocean circulation within the limits of a simple three-box model of the climatic ocean-atmosphere-glacier system is studied. When ocean distribution is asymmetric relative to the equator, the thermohaline circulation has four stable steady states. It is shown that solutions of the nonstationary equations contain autooscillations with a period of approximately 80 kyr, which causes a periodic change of the regimes of the thermohaline ocean circulation. Duration of the existence of separate circulation regimes, as well as their sequences, depend crucially on the relation of the areas of ocean and land in both hemispheres. (Auth.)

J-45726

Duncombe Rae, C.M., **Physical and chemical marine environment of the Prince Edward Islands (southern ocean) during April/May 1987,** *South African journal of marine science,* 1989 Vol.8, p.301-311, With Afrikaans summary. 31 refs.

Physical (temperature, salinity), nutrient (silicate, phosphate, nitrate, nitrite) and chlorophyll-*a* data collected on a cruise to the Prince Edward Is. during Apr. and May 1987 are presented and discussed. Frontal features and distributions of surface nutrients suggest the presence of the Subantarctic Front at the islands. Further evidence for an anticyclonic eddy over the saddle between the islands is presented. Dilution of the surface mixed layer between the two islands in the group is shown to be the result of run-off from the islands, water which contributes to the nutrient structure of the circuminsular sea. (Auth.)

J-45730

Bölter, M., **Microbiological, planktonic and chemical characteristics and their validity for separation of water masses in the Bransfield Strait, Antarctica,** *South African journal of marine science,* 1987 Vol.5, The Benguela and comparable ecosystems, edited by A.I.L. Payne, J.A. Gulland, and K.H. Brink, p.133-143, With Afrikaans summary. 43 refs.

Oceanographic fronts have an important impact on biological systems in the marine environment, whether associated with coastal currents or upwelling systems. In this study, planktonic, microbiological and chemical parameters were investigated in antarctic waters in order to separate the water masses according to different patterns of biological parameters within the pelagic environment. Non-parametric statistical analysis of the data was used to demonstrate the biological or chemical structure apparently independent of the water masses as defined by conservative properties. This is considered to result mainly from the distribution of planktonic organisms and the behavior of particulate organic material during sedimentation, the latter seeming to be strongly affected by the degree of microbial degradation. It is suggested that the biological definition of water masses should consider the biological history of particular water masses in addition to oceanographic parameters, thereby yielding a better understanding of biological processes in relation to oceanographic fronts. (Auth.)

J-45816

Slip, D.J., **Accumulation of fishing debris, plastic litter, and other artefacts, on Heard and Macquarie Islands in the southern ocean,** *Environmental conservation,* Autumn 1991 18(3), p.249-254, 26 refs.

Sections of coastline of Heard and Macquarie Is. were surveyed for marine debris in the summer of 1987-88 and 1989, respectively. These surveys were carried out at the same sites as previous surveys in 1986-87 at Heard I., and in 1988 at Macquarie I. The minimum rate of artefact accumulation was 13 objects per km of shoreline per year for Heard I., and 90 objects per km of shoreline per year for Macquarie I. Drift-cards, released from known locations and collected on the two islands, show a similar artefact catchment area. Plastic litter was a major component of the debris at both islands. Fisheries-related debris accounted for 40% of all artefacts on Heard I., compared with 29% on Macquarie I. Entanglement of fur seals appears to be more common at Heard I., while plastic ingestion by seabirds appears to be more common at Macquarie I.

J-45819

Hieke Merlin, O., **Geochemical characteristics of western Ross Sea (Antarctica) sediments,** *Marine geology,* July 1991 99(1-2), p.209-229, 40 refs.

A geochemical study of bottom sediments from 50 stations in various Ross Sea sedimentary environments, ranging from the coastal strip to the external platform, situated off southern Victoria Land between the David and Mariner glaciers, has demonstrated the silicate nature of these sediments and significant variations in the major element concentrations. A statistical analysis of the geochemical variables using the cluster method shows that Si is independent of the other elements, which group into associations. A multivariate statistical analysis based on geochemical, granulometric and environmental parameters identifies five distinct sediment groups located in different areas of sedimentation and with peculiar geochemical characteristics. These groups are identified and described. The materials are glacial-detrital, derived from the rocky hinterland formations, and are reworked by transport and deposition processes depending on the energy level of the marine sedimentary environments. Given the scarcity of comparison data from the hinterland rocks, it is difficult to establish the parent rocks of these glaciomarine sediments on the basis of geochemical data alone. Only in the case of the sediments south of Coulman I. can one be certain of a contribution from the McMurdo volcanics. For the external platform sediments, the highest contents of Si and L.O.I. confirm the input of material from biogenic neoformation. (Auth. mod.)

J-45845

Chen, C.T.A., **Descriptive chemical oceanography of the Weddell Sea,** *Republic of China. National Science Council. Proceedings A,* Mar. 1991 15(2), p.133-142, 39 refs.

Concurrent CTD, salinity, O2, nutrients, pH, calcium, total alkalinity, total CO2 and pCO2 were obtained in the Weddell Sea in the late austral winter of 1981 as part of the Weddell Polynya Expedition aboard the Soviet icebreaker *Somov.* These data represent the initial concentrations of chemicals in the most important source region of world ocean bottom waters at the time they were formed. These winter Weddell Sea data were analyzed along with summer data reported in the literature, and the results indicate that: large variations in chemical concentrations occur across the Polar Front; pCO2 in the Weddell Sea surface water is only slightly lower than the atmospheric value; mixing dominates the distribution of chemical properties; pH, O2, total CO2 and pCO2 are useful in identifying the sources of waters in the Weddell Sea, whereas calcium and alkalinity are not; deep waters are not homogeneous but show discontinuities; and the upwelled Weddell Sea Deep Water makes up approximately 1/3 of the surface layer. (Auth.)

J-45889

Munk, W.H., **Heard Island experiment,** *U.S. Naval research reviews,* 1991 43(1), p.2-22, 18 refs.

On Jan. 26, 1991, an acoustic thermometry experiment began as an effort to determine if underwater sound wave travel times can be measured to an accuracy of 0.001 second, the precision required to measure ocean temperatures in fractions of a degree. The experiment involves monitoring of sound waves transmitted from equipment lowered from a vessel stationed near Heard Island and received by an array of coastal stations in the Indian, Atlantic, and Pacific Oceans, including Mawson Station, Bermuda, San Francisco, Coos Bay, OR, Christmas Island (Indian Ocean), and Goa.

J-45895

Anderson, L.G., Jones, E.P., **Transport of CO2 into arctic and antarctic seas: similarities and differences in the driving processes,** *Journal of marine systems,* July 1991 2(1-2), p.81-95, 39 refs.

The transport of CO2 from the atmosphere to the surface water of the ocean is driven by the difference in partial pressure of CO2 at the air-sea interface. Since the atmospheric partial pressure of CO2 is nearly constant over periods of the order of exchange times, changing conditions of the surface of the ocean dominate the exchange process. In polar regions, the partial pressure of CO2 in the ocean is decreased mainly by two processes: a decrease in temperature and biological productivity. Both take place in the Arctic and Antarctic. In the Arctic, the vertical transport of cooled surface water by deep convection occurs mainly in the Greenland Sea and penetrates to a large depth, while in the Antarctic the deep convection does not primarily reach the same depths. Biological production is significant for the vertical transport of carbon in both the Arctic and Antarctic; however, in the Arctic the production is mainly over the large shelves, while in the Antarctic it takes place mostly over the deep ocean. In addition to cooling, surface water can also increase its density by salt addition from ice formation. When this happens over the shelves, high density shelf bottom waters are formed that might be enriched in total carbonate due to decay of organic matter at the sediment surface. These high density bottom waters flow towards the deep ocean, mixing with surrounding waters during transit and ending up at a matching density surface. This process seems to be quantitatively more important in the Arctic than in the Antarctic. Total alkalinity, total carbonate, calcium, oxygen, salinity and temperature data from several expeditions in the Arctic and the SWEDARP 88/89 expedition in the Antarctic are used in this discussion. (Auth. mod.)

J-45925

Thomas, E., **Late Cretaceous-early Eocene mass extinctions in the deep sea,** *Geological Society of America. Special paper,* 1990 No.27, Global catastrophes in earth history; an interdisciplinary conference on impacts, volcanism, and mass mortality. Edited by V.L. Sharpton and P.D. Ward., p.481-495, Refs. p.493-495.

Upper Maastrichtian through lowermost Eocene deep-sea benthic foraminiferal records from Maud Rise (Weddell Sea) demonstrate that there was no mass extinction of these organisms at the end of the Cretaceous. In contrast, there was a global extinction of bathyal to abyssal benthic foraminifera at the end of the Paleocene, occurring in fewer than 25,000 yr at Maud Rise. Many benthic foraminiferal species that had originated during the Cretaceous became extinct, although there was no coeval mass extinction (of comparable importance) of terrestrial organisms and planktonic marine organisms. After this extinction the diversity of benthic faunas on Maud Rise was low for about 260,000 yr, and during the period of low diversity, the assemblages were dominated by species that may indicate the presence of abundant organic carbon, and possibly low concentrations of dissolved oxygen. The dominance suggests that the Paleocene/Eocene deep-sea benthic foraminiferal mass extinction was caused by a decrease in oxygen content of the waters bathing the lower bathyal reaches of the sea floor. Such a change could have been caused by a change in the circulation patterns of deep waters: these waters would become depleted in dissolved oxygen if there were a change from predominant formation of deep waters at high latitudes (cooling and sinking) to initiation of, or a strong increase of, formation at low latitudes (evaporation and sinking). (Auth. mod.)

J-45928

Keir, R.S., Michel, R.L., Weiss, R.F., **Ocean mixing versus gas exchange in Antarctic Shelf waters near 150E,** *Deep-sea research,* Feb. 1992 39(2A), p.97-119, 42 refs.

In Feb. 1985, chlorofluoromethanes (CFMs), tritium and radiocarbon were measured in antarctic continental shelf waters near 150E. These distributions are used to evaluate (1) the transport of Warm Deep Water (WDW) and Antarctic Surface Water onto the shelf, and (2) the gas exchange rates across the sea surface. The time varying response of these tracers to atmospheric forcing is simulated with a box model of the water masses in this region. In the model, horizontal mixing of surface waters strongly affects the shelf radiocarbon level, but the CFMs and tritium are not affected. The observed low tritium concentrations (<0.2 TU) in the shelf waters provide a lower limit to the transport of tritium-deficient Warm Deep Water into the region, which is equivalent to a vertical flux of about 75 m/y. This implies a maximum residence time of WDW in the basin of about 8 years. The transport of subsurface water out of the basin at the shelf break is estimated to be approximately 200,000-400,000 cu m/s. The average annual CFM piston velocity for gas exchange is estimated to be about 200 m/y. (Auth.)

J-45930

Bersch, M., Becker, G.A., Frey, H., Koltermann, K.P., **Topographic effects of the Maud Rise on the stratification and circulation of the Weddell Gyre,** *Deep-sea research,* Feb. 1992 39(2A), p.303-331, 17 refs.

Hydrographic data indicate that due to the Maud Rise the upwelling of relatively warm and more saline Lower Circumpolar Deep Water (LCDW) in the Weddell Gyre and the entrainment of LCDW into the upper layer are enhanced, which increases the ocean heat loss and enriches the salinity of the upper layer. By these processes the water column is preconditioned for deep convection. An anomalous water column with a diameter of about 150-200 km, notable for its relatively cold deep water and its relatively saline upper layer, is situated above the crest of the Maud Rise. Water from its main pycnocline spreads laterally within the upper 500 m and compensates for the entrainment of LCDW into the upper layer. Current meter data from the Winter Sea Project 1986 show a marked temporal and spatial variability of the southward transport of LCDW in the lee of the Maud Rise. An anticyclone of LCDW, which had cut off from the main body of LCDW east of the Maud Rise, migrated southward along the western slope with a velocity of about 3 cm/s. It was followed by a cyclone, which had probably formed at the front of the anomaly due to a strengthened flow, undergoing an enhanced meandering. The wavelength of the entire disturbance is estimated to be about 380 km, one-third of the circumference of the Maud Rise anomaly. If the disturbance repeats continuously, about two to three anticyclones detach per year. (Auth.)

J-45933

Charles, C.D., **Biogenic opal in southern ocean sediments over the last 450,000 years: implications for surface water chemistry and circulation,** *Paleoceanography,* Dec. 1991 6(6), p.697-728, Refs. p.727-728.

Records are presented of biogenic opal percentage and burial rate in 12 piston cores from the Atlantic and Indian sectors of the southern ocean. These records provide a detailed quantitative description of changing patterns of opal deposition over the last 450 kyr. The striking regional coherence of these records suggests that dissolution in the deep sea and sediment pore waters does not obscure the surface productivity signal, and therefore these opal time series can be used in combination with other surface water tracers to make inferences about the chemistry and circulation of the southern ocean under different global climate conditions. Three broad depositional patterns can be distinguished. Taken as a whole, the opal records show no evidence for the increased total antarctic productivity predicted by recent geochemical models of atmospheric CO2 variability. (Auth. mod.)

J-45946

Comiso, J.C., **Satellite remote sensing of the polar oceans,** *Journal of marine systems,* Aug. 1991 2(3-4), p.395-434, Refs. p.431-434.

This paper presents a review of past, present, and future satellite systems, methods and techniques of interpretation and potential applications to the study of the polar oceans. Among the satellite-borne sensors examined are passive sensors, typified by microwave and infrared radiometers, and active sensors, as represented by synthetic aperture radar. The performance of these instruments in the remote sensing of sea ice properties and biota, in both the Arctic and Antarctic, is emphasized. (Auth. mod.)

J-45947

Veth, C., **Evolution of the upper water layer in the marginal ice zone, austral spring 1988, Scotia-Weddell Sea,** *Journal of marine systems,* Aug. 1991 2(3-4), p.451-464, 25 refs.

In this paper, a one-dimensional turbulent erosion model is presented to study the temporal behavior of the upper layers of the water column in the marginal ice zone during ice retreat. Input parameters in the model are the regular meteorological observations on board, global radiation and ice cover estimates. The model results are validated by comparison with CTD profiles measured during repeated sections through the marginal ice zone of the Weddell-Scotia Sea sector of the southern ocean over a six week-period in the austral spring, 1988. (Auth. mod.)

J-45948

Grebmeier, J.M., Barry, J.P., **Influence of oceanographic processes on pelagic- benthic coupling in polar regions: a benthic perspective,** *Journal of marine systems,* Aug. 1991 2(3-4), p.495-518, Refs. p.514-518.

A major difference between the Antarctic and Arctic is that the nearshore deep Antarctic is characterized by relatively high benthic abundance and biomass despite low water column production, suggesting that stability, low disturbance levels and cold temperatures enable benthic organisms to grow larger than in the Arctic. Both physical and biological disturbance levels are high in the marginal seas of the Arctic and may directly influence benthic productivity. The relationship between primary production and sedimentation of organic material to the benthos is nonlinear due to its dependence on the role of the pelagic food web. This review discusses the pelagic system with respect to how it impacts the net food supply reaching the benthos. A major objective is to demonstrate the influence of oceanographic processes on pelagic-benthic coupling in polar regions from a "bottom-up" perspective, using benthic studies from various regions in both the Arctic and Antarctic. Similarities and differences in oceanographic processes, benthic abundance and biomass, and benthic carbon cycling within these polar marine systems are discussed and areas for further research identified. (Auth. mod.)

J-45990

Gordon, A.L., **Southern ocean: its involvement in global change,** International Conference on the Role of the Polar Regions in Global Change, Fairbanks, June 11-15, 1990. Proceedings, Vol.1, Fairbanks, University of Alaska, Dec. 1991, p.249-255, 35 refs.

Within the seasonal sea ice zone and along the margins of Antarctica, convection injects very cold oxygenated water into the deep and bottom ocean. These conditions developed as Antarctica shifted into its present configuration and grew a persistent glacial ice sheet, about 14 m.y.a. The potential of the southern ocean to ventilate the deep and bottom ocean layers is related to occurrence of polynyas that form within the winter sea ice cover. Global climate changes would be expected to alter the polynya size and frequency. Under greenhouse-induced warming, offshore polynyas may become less common as the static stability of the southern ocean mixed layer increases. This would diminish the southern ocean's cooling influence on the deep layers of the world ocean, resulting in a warmer deep ocean. The fate of coastal polynyas is less clear. It is likely that they would continue at close to their present form, providing a setting conducive to Antarctic Bottom Water formation. Within the polar front zone, global warming is expected to create lower salinity though slightly cooler surface water. A reduction in the salt input to the Antarctic Intermediate Water would inject it into a shallower horizon at the thermocline base, further limiting the thickness of the thermocline. (Auth. mod.)

J-45991

Simmonds, I., Budd, W.F., **Model studies of the effects of global warming and antarctic sea ice changes on antarctic and global climates,** International Conference on the Role of the Polar Regions in Global Change, Fairbanks, June 11-15, 1990. Proceedings, Vol.1, Fairbanks, University of Alaska, Dec. 1991, p.256-262, 18 refs.

Results are discussed obtained in 3 experiments of changing the global ocean temperatures and the concentration and distribution of antarctic sea ice in a General Circulation Model of July climate. The object was to determine the local and global impacts of antarctic sea ice variations alone, as distinct from those coupled with global scale temperature changes which may be associated with global warming. In all cases there were significant changes in the upward flux of sensible heat over the sea ice zone associated with the reductions of sea ice. The response of weaker westerlies between 40 and 65S was common to all 3 experiments. Analyses suggest that a significant proportion of this is a response to the change in sea ice concentration alone. It is suggested that when consideration is given to the possible impact of feedbacks not considered in these experiments, sea ice changes alone, and particularly those in the Southern Hemisphere, have the potential to induce changes on a hemispheric scale. (Auth. mod.)

J-45997
Nelson, D.M., Gordon, L.I., **Distributions of biogenic silica and dissolved silicic acid in the surface waters of the Ross Sea, Jan. and Feb. 1990,** *Antarctic journal of the United States,* 1990 25(5), p.98-100, 10 refs.

The east-west distributions of dissolved and particulate silica in the western Ross Sea in the summer of 1990 were very similar to those observed in the same region in the summer of 1983: there is clear evidence that an ice-edge diatom bloom had produced exceptionally high (>25 micromoles/l) biogenic silica levels in the surface water with corresponding depletion of dissolved silicic acid. The 1990 transect, however, extended considerably further east than any that had been occupied before and showed 2 other regions of biogenic silica accumulation (more than 8 micromoles/l) and silicic acid depletion to the east. Unlike the diatom bloom to the west, these eastern features had a more mixed algal assemblage. It is concluded that the annual mass balances of both biogenic silica and organic carbon in the water column of the Ross Sea are likely to be considered more complex, and the spatially integrated production rates higher, than preliminary mass balances based largely on 1983 data.

J-46000
Barry, J.P., Dayton, P.K., Dunbar, R., Leventer-Reed, A.R., **Winter oceanographic observations in McMurdo Sound, Antarctica,** *Antarctic journal of the United States,* 1990 25(5), p.106-107, 2 refs.

To measure ocean currents in McMurdo Sound, a current-meter was deployed during Jan., and recovered in Nov., of 1989. The current pattern differed considerably at 2 sampling depths. Flow near the bottom (570 m) was nearly always toward the south along the main axis of the sound, with a net speed of 3.6 cm/s. The average current speed, irrespective of direction, was 6.7 cm/s. In contrast, the shallow meter (180 m) indicated that currents were much more variable in speed and direction, with a net flow toward the northeast at 2.1 cm/s. The mean adirectional speed was slightly lower at 180 m (6.0 cm/s) than at 570 m. These observations suggest that there are seasonal or interannual changes in the flow pattern in the upper water column or there is a countercurrent flowing toward the northeast near 170 m, or both. The salinity and temperature data indicate dramatic seasonal and shorter-period shifts in these two parameters. In addition, the temperature and salinity are strongly inversely related to one another, indicating that changes in salinity are related to the addition of warmer meltwater from sea ice or glacial ice, or both.

J-46001
Michel, R.L., Schroeder, R.A., **Stable isotope results, Wilkes Land Oceanographic Expedition, 1985,** *Antarctic journal of the United States,* 1990 25(5), p.107-109, 5 refs.

During Feb. 1985, an oceanographic investigation was carried out along the antarctic shelf break from 145E to 160E. Physical, chemical and biological data were collected to study the water masses in the region and their interaction, including the distribution of deuterium and oxygen-18. The results of the seawater analyses are given in a table, along with temperature, salinity, density, and oxygen data at the same depths. Data show that isotopic differences between water masses are near the analytical uncertainty, although there is some indication that the Warm Deep Water is slightly more positive and that the very cold shelf bottom waters are slightly more negative. Samples of pack ice also were collected by coring an ice floe on the shelf. This ice floe was approximately 4 m thick at the center, and stable isotopic compositions were determined from four depths. During the freezing process, a marked isotopic fractionation occurs with the ice becoming enriched in the heavy isotope.

J-46002
Gordon, A.L., Huber, B.A., **Winter Weddell Gyre Study, 1989: physical oceanography on board *Akademik Fedorov*,** *Antarctic journal of the United States,* 1990 25(5), p.110-113, 3 refs.

As part of a continuing international effort, science teams on board the icebreaking research vessels *Akademik Fedorov* and *Polarstern* carried out austral winter research in the Weddell Gyre in 1989. A cluster of closely spaced conductivity-temperature-depth stations including a 1-week time series was obtained at a site west of Maud Rise, where summer-period data reveal the frequent presence of a large pool of warm deep water with associated high oceanic heat flux, the effects of which are evident in the sea-ice characteristics and from atmospheric boundary layer measurements. The combined *Fedorov-Polarstern* data provide a nearly synoptic view of the east-west spatial variability across the winter Weddell Gyre, including the gyre inflow in the east, the western boundary current, the central hub of the gyre, the downstream region from Maud Rise with the expected thermohaline perturbations, and across the northern boundary of the gyre in the Scotia Sea region.

J-46003
Gordon, L.I., Jennings, J.C., Jr., **Winter Weddell Gyre Study 1989: nutrient, oxygen, and biomass chemistry on board F.S. *Polarstern*,** *Antarctic journal of the United States,* 1990 25(5), p.113-115, 4 refs.

The chemistry program of WWGS 89 was designed to provide an accurate, precise set of chemical data in order to quantify the Weddell Gyre circulation and the heat, salt, and chemical transports related to it at the end of the winter season. The surface mixed layer was found to be nearly homogeneous vertically in oxygen and nutrient concentrations. Dissolved oxygen was undersaturated below the pack ice, but no clear trend of increasing or decreasing undersaturation with location was seen along the main transect from the Antarctic Peninsula to Cape Norvegia. In the shallow sections the main body of the Weddell Gyre is easily distinguished from the outflowing western boundary current in the northwest and the inflowing coastal current in the southeast. Each terminus of the transect was characterized by very deep mixed layers, and only in the central gyre were there significant accumulations of nitrite and ammonium. The analyses of nutrient concentrations in ice core subsamples revealed considerable variability. Ammonium concentrations were usually much higher than in the underlying surface waters, and often higher than any normal seawater ammonium levels. Phosphate exhibited greater variability than did the other nutrients. There did not appear to be a strong correlation of nutrient concentration with ice structure or texture.

J-46011
Amos, A.F., Jacobs, S.S., Hu, J.H., **RACER: hydrography of the surface waters during the spring bloom in the Gerlache Strait,** *Antarctic journal of the United States,* 1990 25(5), p.131-134, 7 refs.

This study of the hydrography of the upper waters of the Gerlache Strait was done as part of the RACER (Research on Antarctic Coastal Ecosystems and Rates) study. The goal was to aid in answering two questions posed by the RACER investigators: namely, what physical mechanisms account for the productivity of the Gerlache Strait, and what role does mass-transport play in determining biomass gradients there. Four series of replicate conductivity-temperature-depth (CTD) stations to 500 m were made at the RACER grid locations within a period of 26 days. The time-series relationship of waters in the RACER area in Nov. 1990 shows the influence of four distinct water masses. They are a fresh surface layer which warms to above 1 C as the month progresses, a colder subsurface layer around 34 per mill, probably a remnant of "Winter Water," a high-salinity warm water (>34.6 per mill) found below 300 m in the Bransfield, and a cold (<0 C), saline (>34.5 per mill) water found at the bottom. Within the Gerlache Strait, specifically at time-series station A, there is evidence of each of these masses influencing the water column, as indicated by the shape of the time-series curve, shown in a figure.

J-46012

Niiler, P., Illeman, J., Hu, J.H., **RACER: Lagrangian drifter observations of surface circulation in the Gerlache and Bransfield Straits,** *Antarctic journal of the United States,* 1990 25(5), p.134-137, 1 ref.

A new family of Argos satellite-tracked near surface drifters, called TRISTARs, which have the capability of following water particles of a few meters' horizontal and vertical scale in the upper ocean with an accuracy of 1 cm/s or 1 km/d, are described. In Gerlache and Bransfield Straits, 18 drifters were deployed and, in the ice-filled sea, 12 of them survived long enough to provide the data set, part of which is displayed in a figure. The Lagrangian technique is found to be a very powerful tool in rendering an insightful view of circulation patterns, especially in areas where no measurements have ever been done before, because both temporal and spatial scales are revealed in real time. This study shows that there are many new patterns to be discerned in antarctic waters. The complex circulation patterns in the Gerlache Strait and the immediate vicinity of its merging with the Bransfield Strait are shown in a figure.

J-46017

Karl, D.M., Hebel, D.V., **RACER: dissolved oxygen and nitrate dynamics during the 1989 austral spring bloom,** *Antarctic journal of the United States,* 1990 25(5), p.149-151, 17 refs.

During the Research on Antarctic Coastal Ecosystem Rates (RACER) 1989-1990 field program, measurements of seasonal dissolved inorganic carbon, dissolved organic carbon, oxygen, nitrate, dissolved organic nitrogen, and phosphate dynamics and seasonal sediment-trap measurements were combined with direct estimates of autotrophic, microheterotrophic, and macrozooplankton biomass and rate processes. A regional investigation of the near-surface water (5 m) dissolved oxygen concentrations over a limited RACER study area has identified substantial areas of net ecosystem production during Nov. 1989, with oxygen concentrations in excess of 400 micromoles/l.

J-46019

Tupas, L.M., Koike, I., Holm-Hansen, O., **RACER: Microbial uptake and regeneration of ammonium during the austral spring bloom,** *Antarctic journal of the United States,* 1990 25(5), p.154-155, 13 refs.

As part of the Research on Antarctic Coastal Ecosystem Rates (RACER) study on nitrogen dynamics, the uptake and regeneration of ammonium by bacterial heterotrophs were examined to determine the extent of their role as consumers or mineralizers of ammonium, and to assess their possible impact on nutrient dynamics in this highly productive area. Findings on the dynamics of the microbial population in the Gerlache Strait show that this component of the microbial food web plays a significant role in the cycling of available dissolved organic nitrogen and ammonium in the area, and this will influence the growth and abundance of both autotrophic and heterotrophic organisms.

J-46071

Shirodkar, P.V., Goes, J.I., Alagarsamy, R., Fondekar, S.P., **Major elements, nutrients, and plankton biomass in the ice edge and an offshore region of the Indian Ocean sector of the southern ocean,** *Polar record,* Apr. 1992 28(165), p.127-136, 28 refs.

Physico-chemical and biological studies during summer of 1986-1987 in the ice-edge and a region offshore of Antarctica indicated significant spatial differences in concentrations of nutrients, dissolved oxygen (DO), Ca, Mg, and chlorophyll *a,* and in the rates of primary production. The waters within the ice-edge region were richer in nutrients and DO and showed a four-fold increase in chlorophyll *a* and a 10- fold increase in primary productivity as compared with offshore waters. In the ice-edge region, Mg was high, whereas values of Ca were within the normal range. Offshore Ca and Mg were within the expected limits. Nutrients in the ice-edge region showed increasing concentrations at deeper levels, irrespective of their relationship with DO, indicating large amounts of preformed nutrients, a characteristic of antarctic waters attributable to intense upwelling. Chlorophyll *a* showed a direct relation with primary productivity and an inverse relation with Mg, suggesting the release of Mg from biogenic matter. Offshore, phosphate-phosphorus (PO4-P) was significantly correlated with nitrate-nitrogen (NO3-N) and inversely correlated with primary productivity and chlorophyll *a,* indicating the utilization of PO4-P during high production. Significantly elevated concentrations of chlorophyll *a,* primary productivity and Mg, marked by a considerable decrease in nutrients, were observed at a frontal zone between 64 and 62S. (Auth. mod.)

J-46100

Goeyens, L., **Spatiotemporal variability of inorganic nitrogen stocks and uptake fluxes in the Scotia-Weddell Confluence area during November and December 1988,** *Marine ecology progress series,* Oct. 1991 77(1), p.7-19, 48 refs.

Distributions of nitrate and ammonium and corresponding uptake fluxes were investigated in the Scotia- Weddell Confluence area during EPOS LEG 2 (Nov. and Dec. 1988) on board RV *Polarstern.* In this area a central low-salinity and low-nitrate compartment extends southward from the Scotia Front over 1 to 1.5 deg. latitude. High ammonium concentrations and marked nitrate depletions indicate an enhanced biological activity in this part of the ocean. By means of the uptake rates obtained from N-15 incubations, and of nitrate depletion data, it is proved that this marginal ice zone ecosystem shifts from predominantly new production based (highest f-ratio 0.83) to regenerated production based (lowest f-ratio 0.30) after some 3 wk. This transition corresponds with the change from a higher diatom presence to a higher flagellate presence in the phytoplankton community. Moreover, it is in agreement with the described sudden termination of export fluxes in the Weddell Sea. (Auth.)

J-46144

Antarctica Project. Environmental impact: chemical methodologies, [Rome, Italian Research Council, 1991], p.275-613, Reprinted from Annali di chimica, 1991, Vol.81(7-8 and 9-10). Refs. passim. For individual papers see B-46150, B-46168, E-46151, E-46154, E-46157, E-46158, E-46161, E-46164, F-46148, I-46155, I-46159, I-46167, I-46170, J-46145 through J-46147, J-46149, J-46152, J-46153, J-46156, J-46160, J-46162, J-46163, J-46165, J-46166 and J-46169 or 46-3529 through 46-3536.

This volume presents reprints from Vol. 81, Nos. 7-8 and 9-10, of the Annali di chimica, published by the Italian Chemical Society in Rome, 1991. Both issues contain reports from research units of various Italian expeditions to Antarctica between 1987 and 1989. The research projects focused on the chemical composition of the atmosphere, as well as terrestrial and marine environments (sea water, sediments, suspended matter, ice, fish, fresh water, snow, aerosols) and on the human factor resulting from activities at the Terra Nova Bay Station.

J-46145
Capodaglio, G., Scarponi, G., Toscano, G., Cescon, P., **Cadmium complexation in surface seawater of Terra Nova Bay (Antarctica),** Antarctica Project. Environmental impact: chemical methodologies, [Rome, Italian Research Council, 1991], p.279-296, Reprinted from Annali di chimica, 1991, Vol.81(7-8 and 9-10). 28 refs. For another version of this article see 19J-44318.

Cadmium complexation in the surface water of Terra Nova Bay, collected during the 3rd (1987-88) and 4th (1988-89) Italian expeditions, was studied by Differential Pulse Anodic Stripping Voltammetry (DPASV). Total dissolved cadmium concentration ranged between 0.08 and 0.69 nM. Temporal variations in sea conditions, occurring during the summer, are likely to be responsible for most of the high variability of data. Considerable differences in the Cd content were observed between samples collected under the pack and those taken after the sea ice had melted. A possible explanation is given. The inorganic or ASV-labile fraction of the metal was 21-75%. Data obtained were consistent with one class of organic ligands whose concentration varied between 0.12 and 2.10 nM. The mean value for the logarithm of the conditional stability constant was 9.5. (Auth.)

J-46146
Papoff, P., Betti, M., Onor, M., Giovannoni, G., **Individual spread of concentrations of alkali and alkaline-earth elements in sea water samples from Terra Nova Bay—Ross Sea (Antarctica). 2,** Antarctica Project. Environmental impact: chemical methodologies, [Rome, Italian Research Council, 1991], p.297-315, Reprinted from Annali di chimica, 1991, Vol.81(7-8 and 9-10). 9 refs. For part 1 of this article see 19J-44316.

Results from the determination of alkali and alkaline-earth elements in filtered and acidified sea water samples from Terra Nova Bay (1987-88 and the 1988-89 expeditions) are presented. The average concentration values between stations ranged in the interval 390-460, 5.1-8.0, 46-59, and 6.4-15.0 macro-M for sodium, potassium, magnesium and calcium respectively; and 14-30 micro-M for lithium. Relative standard deviations lower than 1% were usually observed for all the elements whatever their concentration levels in the solution injected into the chromatographic column, with the exception of lithium (2%). The degree of representativity of the samples with respect to the real system around each sampling station was estimated for all the elements. Individual fluctuations in the concentration of the elements, due to external events, are highlighted. (Auth.)

J-46147
Saini, G., Baiocchi, C., Giacosa, D., Roggero, M.A., **Determination of some heavy metals in snow and sea water at Terra Nova Bay (Antarctica),** Antarctica Project. Environmental impact: chemical methodologies, [Rome, Italian Research Council, 1991], p.317-324, Reprinted from Annali di chimica, 1991, Vol.81(7-8 and 9-10). 16 refs.

Samples of seawater and of snow collected by the Italian expedition to Antarctica in 1988-89 in the area of the Terra Nova Bay Station and in the Ross Sea have been analyzed for Cu, Ni, Cd, Cr and Mn. Preconcentration of seawater samples has been made by reductive precipitation, while snow samples have been lyophilized. The determinations were made by GFAAS with Zeeman background correction. The results, showing highest concentrations of the elements in the vicinity of the Station, are discussed. (Auth.)

J-46149
Mentasti, E., Porta, V., Abollino, O., Sarzanini, C., **Metal trace determination in seawater samples from Antarctica. 2,** Antarctica Project. Environmental impact: chemical methodologies, [Rome, Italian Research Council, 1991], p.343-355, Reprinted from Annali di chimica, 1991, Vol.81(7-8 and 9-10). 9 refs. For part 1 of this article see 19J-44320.

A series of metal ion traces in the water of the Ross Sea were determined using ICP atomic emission spectroscopy. In order to obtain the sensitivity required, enrichment procedures based on precomplexation/adsorption on a minicolumn have been optimized and adopted. Such procedures allow a closed-loop on-line treatment of the sample which ensures very limited alteration of the sample. For the retention of metal traces, 8-hydroxyquinoline (8-Oxine) or 1-(2-thiazolylazo)-2-naphthol (TAN) were used in conjunction with Amberlite XAD-2 resin. Precision, accuracy, blanks and detection limits of the optimized procedures are discussed. (Auth.)

J-46152
Fuoco, R., Colombini, M.P., Abete, C., **Evaluation of pack melting effect on polychlorobiphenyl content in sea water samples from Terra Nova Bay, Ross Sea (Antarctica),** Antarctica Project. Environmental impact: chemical methodologies, [Rome, Italian Research Council, 1991], p.383-394, Reprinted from Annali di chimica, 1991, Vol.81(7-8 and 9-10). 11 refs.

The total contents of PCB in sea water samples collected in Terra Nova Bay during the Italian expedition of 1988-1989 are reported along with individual PCB isomer concentrations. Liquid-liquid extraction with n-hexane was found to be more reproducible than solid-liquid extraction. Clean-up of extracts was effected on a Florisil column which in experimental conditions eliminates interferences due to other chlorinated pesticides. PCB determination and identification were performed by high resolution gas-chromatography (HRGC) and HRGC/FT-IR spectrometry respectively. The results obtained showed for the area under study a typical value of 0.6 ng/l as total PCB concentration and a temporary local increase up to 1.7 ng/l which may be due to pack melting. Distribution among congener classes showed a chlorination level similar to that observed for oceanic waters and centering on three to penta substituted isomers. (Auth.)

J-46153
Desideri, P., Lepri, L., Checchini, L., **Organic compounds in sea water and pack ice in Terra Nova Bay (Antarctica),** Antarctica Project. Environmental impact: chemical methodologies, [Rome, Italian Research Council, 1991], p.395-416, Reprinted from Annali di chimica, 1991, Vol.81(7-8 and 9-10). 5 refs.

Sea water and pack ice samples taken from Terra Nova Bay during the 1988/89 4th Italian expedition to Antarctica were analyzed by using High Resolution Gas Chromatography (HRGC) and GC-MS. Several biogenic and anthropogenic organic compounds were identified in the two matrices. Some classes of organic compounds were more prevalent in pack ice than in the sea water under the pack, and in the sea water taken at the surface during the natural melting process of the pack. The results were compared with those obtained from the sea water samples taken during the previous expedition (1987/88). (Auth.)

J-46156
Loglio, G., **Air-sea exchange in antarctic environment and snow microcomponents,** Antarctica Project. Environmental impact: chemical methodologies, [Rome, Italian Research Council, 1991], p.453-467, Reprinted from Annali di chimica, 1991, Vol.81(7-8 and 9-10). 12 refs.

The process of the air-sea exchange of matter was studied in Terra Nova Bay seawater with the aim of characterizing the antarctic marine environment. The samples were collected during the expeditions of 1988-1989 and 1989-1990. The presence of surfactant and fluorescent materials is evidenced in the snow. On the basis of laboratory experiments, a photochemical effect on these components is suggested for high-altitude snow depositions. Laboratory investigations on the formation of sea-water aerosol appear useful for a better understanding of natural aerosol transport. (Auth.)

J-46160
Morselli, L., Zappoli, S., Donati, A., **Evaluation of the occurrence of PCBs in Terra Nova Bay, Ross sea. Results of the second campaign,** Antarctica Project. Environmental impact: chemical methodologies, [Rome, Italian Research Council, 1991], p.503-510, Reprinted from Annali di chimica, 1991, Vol.81(7-8 and 9-10). 10 refs.

The results of the determination of polychlorobiphenyls (PCBs) in sea water and samples of soil collected in Terra Nova Bay during the second Italian scientific campaign in winter 1988/89 are presented. Trace concentrations of PCBs were detected in all the samples analyzed. From the diffusion of PCB contamination and the samples' chromatographic profile, it can be assumed that PCBs are transported to the Antarctic by means of a long-range mechanism. Details on sample treatment are given. (Auth.)

J-46162
Baffi, F., Cardinale, A.M., Soggia, F., Frache, R., **Heavy metal distribution in suspended matter in coastal and offshore waters of the Ross Sea (Antarctica),** Antarctica Project. Environmental impact: chemical methodologies, [Rome, Italian Research Council, 1991], p.523-531, Reprinted from Annali di chimica, 1991, Vol.81(7-8 and 9-10). 3 refs.

The results obtained for Cd, Ni, Fe, Cr, Cu and Al concentrations in suspended particulate samples, related to the 1989/90 antarctic expedition, are reported. Results were compared with those previously published, related to the 1987/88 and 1988/89 expeditions, to begin the development of a particulate metal distribution model. (Auth.)

J-46163
Desideri, P., Lepri, L., Santianni, D., Checchini, L., **Chlorinated pesticides in sea water and pack ice in Terra Nova Bay (Antarctica),** Antarctica Project. Environmental impact: chemical methodologies, [Rome, Italian Research Council, 1991], p.533-540, Reprinted from Annali di chimica, 1991, Vol.81(7-8 and 9-10). 22 refs.

Sea water, pack and particulate samples collected around the Italian research station in Antarctica and the adjacent Terra Nova Bay from Dec. 1988 to Feb. 1989 were analyzed for the presence of chlorinated pesticides; HCHs, DDTs, aldrin, dieldrin and heptachlor were found. The concentrations of HCH isomers (alfa-HCH and lindane) were nearly the same as those reported by Tanabe *et al.* in different areas of Antarctica in the period Dec. 1980-Mar. 1982. (Auth.)

J-46165
Triulzi, C., **Presence of radionuclides in biotic and abiotic matrixes collected in the environment around the Italian Base in Antarctica,** Antarctica Project. Environmental impact: chemical methodologies, [Rome, Italian Research Council, 1991], p.549-561, Reprinted from Annali di chimica, 1991, Vol.81(7-8 and 9-10). 11 refs.

Results obtained from analyses of both natural and artificial radioactivity contained in samples collected in the inlet surrounding the Italian base and in Terra Nova Bay during the 1988-89 and 1989-90 expeditions, are presented in this paper. The data were obtained from marine water, organisms and sediment; lacustrine water, vegetable and sediment; and soil, mosses and lichens sampled at different stations. Tabulated results on K-40, Cs-137, Th-232 and U-238 are given. Caesium isotopes are compared with data obtained from similar material collected in the Northern Hemisphere. (Auth.)

J-46166
Cremisini, C., Orlandi, C., Torcini, S., **Major, minor and trace elements in the surface waters at Terra Nova Bay (Antarctica). Data collected during the 2nd, 3rd and 4th Italian expeditions (1986-1989),** Antarctica Project. Environmental impact: chemical methodologies, [Rome, Italian Research Council, 1991], p.563-577, Reprinted from Annali di chimica, 1991, Vol.81(7-8 and 9-10). 22 refs.

Concentrations of major, minor and trace elements are reported for 60 samples of meltwaters, streams and small lakes taken at 28 different sites in Terra Nova Bay. The chemical composition of the waters analyzed is clearly affected by salt of marine origin, the influence of sea spray being evident; sodium and chlorine are the dominant ions while rock weathering is a subordinate source of chemicals. Trace element levels do not exhibit anomalous values. (Auth.)

J-46169
Desideri, P., Lepri, L., Checchini, L., **Identification and determination of organic compounds in antarctic sediments,** Antarctica Project. Environmental impact: chemical methodologies, [Rome, Italian Research Council, 1991], p.595-603, Reprinted from Annali di chimica, 1991, Vol.81(7-8 and 9-10). 3 refs.

Sediment samples taken from the Terra Nova Bay Station and the Ross Sea during the 3rd Italian expedition (1987/88) have been analyzed for the presence of natural and anthropogenic organic compounds. Linear and branched aliphatic hydrocarbons, alkyl derivatives of benzene, polycyclic hydrocarbons and heterocompounds such as phthalates, amides, alcohols, benzotiophenes, have been identified. The distribution and concentration of biogenic and anthropogenic compounds in the sediments, and the distribution ratio between sediments and sea water of some phthalates, are reported. (Auth.)

J-46194
Odamaki, M., **Mean sea level observed at Syowa Station, East Antarctica,** NIPR Symposium on Antarctic Geosciences, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1991, p.20-28, 7 refs.

Continued tidal observation have been carried out at Showa Station as part of the Japanese Antarctic Research Expedition project since 1966. The tidal observation system and data processing manner are described in this paper. Using the well-controlled data from 1981 to 1987, monthly mean sea-levels are analyzed and show a trend of falling at about 1 cm/yr. It is also shown that seasonal changes of mean sea-level at Showa Station are greater than those at other stations on the antarctic ocean. (Auth. mod.)

J-46208
Tréguer, P., ed, Quéguiner, B., ed, **Biochemistry and circulation of water masses in the southern ocean,** *Marine chemistry,* Nov. 1991 35(1-4), Symposium on Biochemistry and Circulation of Water Masses in the Southern Ocean, July 1990. Proceedings. Edited by P. Tréguer and B. Quéguiner, 623p., Proceedings of a symposium, July 1990, Brest, France. For individual papers see B-46225 through B-46234, B-46240 through B-46242, J-45537, J-46209 through J-46224, J-46235 through J-46239 and J-46243 through J-46250.

The antarctic ocean represents the greatest area of nutrient-rich seawater on the earth. However, this region is now thought to be much less photosynthetically productive than was believed 10 years ago, and the major part of the antarctic ocean is one of the less productive marine ecosystems (processes limiting primary production are still a matter of debate). Pelagic autotrophic production does however support large biomasses at higher trophic levels. As studies become more numerous, and with the increased use of new facilities (sediment traps, satellite imagery, ice-breaking research vessels and submarine sensors), it becomes clear that the southern ocean is a complex mosaic of subsystems (open ocean areas, marginal ice zone, sea-ice zone and coastal and island systems). Large seasonal, annual and interannual variability of material fluxes in the pelagic ecosystems is indicated by recent studies. Little is known about the cycling of biogenic material at the sediment-water interface and through the benthic ecosystems, which do not appear to be as impoverished as previously expected. Specific aspects of these topics related to the biogeochemistry and circulation of water masses were presented and discussed during the July, 1990 International Symposium in Brest, France, including 120 scientists originating from 17 countries.

J-46209
Nowlin, W.D., Jr., **On water mass exchange between the southern ocean and the World Ocean; emphasis on the Atlantic sector,** *Marine chemistry,* Nov. 1991 35(1-4), Symposium on Biochemistry and Circulation of Water Masses in the Southern Ocean, July 1990. Proceedings. Edited by P. Tréguer and B. Quéguiner, p.1-7, 32 refs.

Reviewed here are the principal mechanisms for water mass exchange between the southern ocean and the remaining World Ocean: wind stress acting on the southern ocean drives the eastward-flowing Antarctic Circumpolar Current (ACC). Deep convection occurring south of the ACC, within or on the edges of the cyclonic subpolar gyres, renews bottom and deep waters. Exchange of water occurs at all depths across the deep-reaching zonal fronts of the ACC. (Auth. mod.)

J-46210
Fahrbach, E., Knoche, M., Rohardt, G., **Estimate of water mass transformation in the southern Weddell Sea,** *Marine chemistry,* Nov. 1991 35(1-4), Symposium on Biochemistry and Circulation of Water Masses in the Southern Ocean, July 1990. Proceedings. Edited by P. Tréguer and B. Quéguiner., p.25-44, 37 refs.

Weddell Sea Bottom Water recirculates in the west. By comparing the in- and outflowing water masses, transformation rates are estimated on the basis of a data set obtained during the Winter Weddell Gyre Study from Sep. to Oct. 1989. This consisted of a salinity-temperature-depth (CTD) section carried out by R/V *Polarstern* from the northern tip of the Antarctic Peninsula to Cape Norvegia, and data from three current meter moorings maintained from 1989 to 1990 in the eastern boundary current off Cape Norvegia. At the mooring site barotropic currents were measured. They were extrapolated to the interior under the assumption that wind-driven, baroclinic and barotropic current fields are of similar shape. The location of the gyre center was determined from drifting buoy tracks and geopotential anomaly. A linear current profile from the eastern boundary current to the center of the gyre was assumed, and the western outflow was determined according to mass conservation. The total mass transport was split into individual water masses. Differences between inflow and outflow result in a transformation rate of 3-4 Sv from Winter and Warm Deep Water to Antarctic and Weddell Sea Bottom Water. The net heat and salt transport across the transect implies heat fluxes from the ocean to the atmosphere of 3-10 W/sq m and ice formation rates of 0.2-0.35 m/yr. (Auth. mod.)

J-46211
Park, Y.H., Gambéroni, L., Charriaud, E., **Frontal structure and transport of the Antarctic Circumpolar Current in the south Indian Ocean,** *Marine chemistry,* Nov. 1991 35(1-4), Symposium on Biochemistry and Circulation of Water Masses in the Southern Ocean, July 1990. Proceedings. Edited by P. Tréguer and B. Quéguiner, p.45-62, 25 refs.

The frontal structure and volume transport of the Antarctic Circumpolar Current (ACC) in the south Indian Ocean sector are described. Recent findings on sea-level variability from GEOSAT altimeter data are reviewed as well as barotropic transport variability from bottom pressure measurements at Kerguelen and Amsterdam Is. The ACC here is mostly concentrated in a narrow frontal zone of 2-3 deg of latitude, without any noticeable multi-band structure, as a result of the confluence of the Subantarctic and Subtropical Fronts. The Polar Front in the sector is not associated with any prominent current core. This regional particularity of the ACC was further supported by GEOSAT altimetry data. About 80% of the ACC transport (106 Sv; 1 Sv= million cu m/s) passes north of Kerguelen, concentrated along the northern flank of the Kerguelen Plateau; only 30 Sv passes south of Kerguelen. The bottom-pressure-derived barotropic transport variability at Kerguelen-Amsterdam passage was estimated to lie between 10 and 30 Sv, consistent with findings at Drake Passage. It is suggested that the study area constitute a prominent ACC observatory during the WOCE (World Ocean Circulation Experiment). (Auth. mod.)

J-46212
Veth, C., **Structure and evolution of the top layers of the water column across the marginal ice zone during spring 1988 in the Scotia-Weddell Sea sector of the southern ocean,** *Marine chemistry,* Nov. 1991 35(1-4), Symposium on Biochemistry and Circulation of Water Masses in the Southern Ocean, July 1990. Proceedings. Edited by P. Tréguer and B. Quéguiner, p.63-76, 19 refs.

The evolution of the wind-mixed layer and surface temperature in a period of ice retreat is studied with a one-dimensional turbulent erosion model. This model is established to provide values for a numbers of physical parameters to be used in ecophysiological modelling of plankton blooms in an area with a retreating ice cover. The wind-mixed layer (WML) model is driven by parameters obtained by regular on-board meteorological observations, visual ice cover estimates and global radiation measurements. The results of numerous conductivity-temperature-depth (CTD) casts performed during the EPOS leg-2 cruise provided the data for the initial conditions and validation. (Auth.)

J-46213
Murphy, P.P., **Autumn air-sea disequilibrium of CO2 in the South Pacific Ocean,** *Marine chemistry,* Nov. 1991 35(1-4), Symposium on Biochemistry and Circulation of Water Masses in the Southern Ocean, July 1990. Proceedings. Edited by P. Tréguer and B. Quéguiner., p.77-84, 13 refs.

Accurate assessment of the role of the South Pacific in the global carbon cycle has been hindered by a paucity of data. In particular, the South Pacific has been suggested as a major sink for CO2 on the basis of measurements made principally in the western basin. The PMEL/NOAA Marine CO2 Program has made basin-wide CO2 measurements over 6 years which now permit estimation of surface CO2 fluxes during the austral autumn. These results suggest that the South Pacific is not a significant sink for atmospheric CO2 during the austral autumn. The study area extends to 60S. (Auth.)

J-46214
Metzl, N., Beauverger, C., Brunet, C., Goyet, C., Poisson, A., **Surface water carbon dioxide in the southwest Indian sector of the southern ocean: a highly variable CO2 source/sink region in summer,** *Marine chemistry,* Nov. 1991 35(1-4), Symposium on Biochemistry and Circulation of Water Masses in the Southern Ocean, July 1990. Proceedings. Edited by P. Tréguer and B. Quéguiner, p.85-95, 37 refs.

Measurements of partial pressure of carbon dioxide (*p*CO2), total dissolved inorganic carbon (TCO2), total alkalinity (TA) and chlorophyll *a* have been made in surface water in the southwestern Indian sector of the southern ocean (20-85E) in the austral summer (INDIVAT V cruise, Jan.-Feb. 1987). Between Antarctica and Africa, *p*CO2 distribution was linked to the oceanic frontal zones and Chl *a* variations. The *p*CO2 spatial structure was very close to that explored in summer 1967 in the same region but the *p*CO2 differences between the ocean and the atmosphere were smaller in 1987 than 20 years ago. At all latitudes strongly contrasting surface *p*CO2 characteristics between eastern (around 80E) and western (around 25E) regions were found; CO2 sources were mainly in the west and CO2 sinks in the east. South of 60S, the contrast could be due to biological activity. Between 60S and the Antarctic Polar Front, intensification of upwelling might be responsible for the higher *p*CO2 values in the west. (Auth.)

J-46215
Schlosser, P., Bullister, J.L., Bayer, R., **Studies of deep water formation and circulation in the Weddell Sea using natural and anthropogenic tracers,** *Marine chemistry,* Nov. 1991 35(1-4), Symposium on Biochemistry and Circulation of Water Masses in the Southern Ocean, July 1990. Proceedings. Edited by P. Tréguer and B. Quéguiner, p.97-122, 36 refs.

The application of natural and anthropogenic trace substances in oceanographic studies of the Weddell Sea is reviewed. The potential of some steady-state and transient tracers (tritium, CFC-11 and CFC-12, O-18, and helium isotopes) for studies of deep water formation and circulation is discussed on the basis of data sets collected mainly on cruises of R/V *Polarstern* to the Weddell Sea during the 1980s. CFC/tritium ratio dating of young water masses is applied to estimate mean age and transit times of water involved in Weddell Sea Bottom Water formation. The history of the CFC-11/tritium ratio through time is derived for Weddell Sea shelf waters. (Auth.)

J-46216
Bayer, R., Schlosser, P., **Tritium profiles in the Weddell Sea,** *Marine chemistry,* Nov. 1991 35(1-4), Symposium on Biochemistry and Circulation of Water Masses in the Southern Ocean, July 1990. Proceedings. Edited by P. Tréguer and B. Quéguiner, p.123-136, 24 refs.

Tritium data were collected between 1985 and 1987 on several cruises of the German research icebreaker *Polarstern* to the Weddell Sea. Maximum tritium concentrations in the surface waters are of the order of 200 mTU. The minimum values observed in the Weddell Sea Deep Water at about 1000 m depth are about 15-40 mTU. The bottom waters show tritium concentrations of about 70-100 mTU in the central gyre, increasing to about 120 mTU in the northwestern corner of the Weddell Sea. The overflowing Ice Shelf Water observed on the continental slope west of the Filchner Depression has tritium concentrations close to those of the surface waters, indicating rapid renewal of this water mass. The data reflect the rapid renewal of the bottom waters in the northwestern corner of the Weddell Sea and the mixing of bottom water from this boundary current into the bottom waters of the central Weddell Gyre. (Auth.)

J-46217
Jean-Baptiste, P., Mantisi, F., Mémery, L., Jamous, D., **He-3 and chlorofluorocarbons (CFC) in the southern ocean: tracers of water masses,** *Marine chemistry,* Nov. 1991 35(1-4), Symposium on Biochemistry and Circulation of Water Masses in the Southern Ocean, July 1990. Proceedings. Edited by P. Tréguer and B. Quéguiner, p.137-150, 19 refs.

The distribution of He-3 across the southern ocean is depicted on the basis of a meridional section between Antarctica and South Africa measured during the INDIGO-3 survey (1988). A core of *delta*He-3 values above 10% is observed south of the Polar Front, associated with very low CFC concentrations. This He-3 enriched layer is documented from the GEOSECS and INDIGO He-3 data in the southern ocean. It is found at a density level around *sigma, theta* =27.8 in all the waters close to Antarctica (i.e. south of 50S). Its zonal distribution suggests that is likely that it originates from the central/eastern Pacific. Hence, it provides an indication of the deep Pacific waters in the Antarctic Circumpolar Current, which are not easily detectable from the standard hydrographic parameters. (Auth.)

J-46218
Mantisi, F., Beauverger, C., Poisson, A., Metzl, N., **Chlorofluoromethanes in the western Indian sector of the southern ocean and their relations with geochemical tracers,** *Marine chemistry,* Nov. 1991 35(1-4), Symposium on Biochemistry and Circulation of Water Masses in the Southern Ocean, July 1990. Proceedings. Edited by P. Tréguer and B. Quéguiner, p.151-167, 34 refs.

The first vertical profiles of chlorofluoromethanes are presented in relation to hydrological and geochemical characteristics. In the open ocean, transient tracer penetration reaches 1000 m. Off the West Ice Shelf and Enderby Land, a significant decrease in freons is found below the cold Winter Water and just above the upper Circumpolar Deep Water (200-400 m). In the region off Mac. Robertson Land, where the oxygen minimum is deeper (1000 m), the freon gradients are less abrupt. In deep open ocean waters, no freons were detected in the core of the Circumpolar Deep Water. However, near the continental shelf, freon minima associated with salinity maxima have been encountered. Over the whole water column, a strong zonal contrast emerges in tracer distributions between stations situated to the east and to the west of Mac. Robertson Land. Freon maxima associated with oxygen maxima and temperature and salinity minima which characterize Antarctic Bottom Water (AABW) have been found over all the region studied; the tracers indicate three main bottom waters that are related to Weddell Sea, Ross Sea and local origins. At two stations located on the edge of the continental shelf, freon measurements suggest that the AABW formation was recent, and the tracers' continuity reveals a preferential westward flow of bottom waters. (Auth. mod.)

J-46219
Fogelqvist, E., **Dimethylsulphide (DMS) in the Weddell Sea surface and bottom water,** *Marine chemistry,* Nov. 1991 35(1-4), Symposium on Biochemistry and Circulation of Water Masses in the Southern Ocean, July 1990. Proceedings. Edited by P. Tréguer and B. Quéguiner, p.169-177, 22 refs.

Dimethylsulphide (DMS) has been measured in the Weddell Sea during the austral summer 1988-1989. In the summer Surface Water, which generally contained a maximum at 20-50 m depth, the concentrations were extremely high, up to 12,000 ng/l DMS, but showed a significant spatial variability. Data from the central part of the Weddell Sea show a steep gradient downwards, and below about 200 m depth, in the Weddell Sea Deep Water, concentrations were below the detection limit of 1 ng/l. The high-density Ice Shelf Water, when flowing down the continental slope, brings DMS down to the Weddell Sea Bottom Water in significant amounts before its eventual decay. (Auth.)

J-46220

Lindegren, R., Anderson, L.G., **'NO' as a conservative tracer in the Weddell Sea,** *Marine chemistry,* Nov. 1991 35(1-4), Symposium on Biochemistry and Circulation of Water Masses in the Southern Ocean, July 1990. Proceedings. Edited by P. Tréguer and B. Quéguiner, p.179-187, 14 refs.

The salinity maximum of the Warm Deep Water advecting into the Weddell Sea lies about 200 m below the temperature maximum and an NO minimum. The NO minimum is horizontally as well as vertically resolved on two sections towards the eastern and southern coast of the Weddell Sea, one towards Cape Norvegia, the other towards the Filchner Ice Shelf, whereas the temperature and salinity maxima are horizontally resolved on the former section only. Thus NO is a valuable complementary tool for studying the boundary current along the coast of the Weddell Sea. The NO signal indicates a non-continuity within the boundary current, as the minimum in the downstream section is deeper than the upstream one. The temperature maximum as well as the NO minimum descend from a depth of about 400 m in the Cape Norvegia section to about 600 m in the Filchner Ice Shelf section, the salinity maximum being correspondingly lowered. A plot of NO vs. salinity shows a continuous mixing line between Warm Deep Water and the freshest part of the Winter Water interval, thus essentially displaying Winter Water as itself lying on a mixing line. This indicates that Warm Deep Water is being advected well into the winter surface layer. (Auth.)

J-46221

Prego, R., **Total organic carbon in the sea-ice zone between Elephant Island and the South Orkney Islands at the start of the austral summer (1988-89),** *Marine chemistry,* Nov. 1991 35(1-4), Symposium on Biochemistry and Circulation of Water Masses in the Southern Ocean, July 1990. Proceedings. Edited by P. Tréguer and B. Quéguiner, p.189-197, 17 refs.

During an antarctic survey carried out on board on R/V *Professor Siedlecki* (26 Dec. 1988-18 Jan. 1989) seawater samples were collected from nine depths, from the surface to 150 m, at 29 stations near the pack-ice in a zone of the Weddell-Scotia Confluence between Elephant I. and the South Orkney Is. The samples were analyzed for total organic carbon (TOC) and silicate concentrations. The two main water masses in the sampling area, coming from the Drake Passage and Weddell Sea, are well-defined, using silicate as a tracer. The concentrations of TOC are higher than 100 *micro*M and are associated with low silicate concentrations. However, in the deep water influenced by the Weddell Sea the concentrations of TOC are about 30 *micro*M. (Auth.)

J-46222

Westerlund, S., Öhman, P., **Iron in the water column of the Weddell Sea,** *Marine chemistry,* Nov. 1991 35(1-4), Symposium on Biochemistry and Circulation of Water Masses in the Southern Ocean, July 1990. Proceedings. Edited by P. Tréguer and B. Quéguiner, p.199-217, 20 refs.

Total, dissolved and suspended iron has been determined in the water column of the Weddell Sea area during the austral summer 1988-1989. Some data are also presented for dissolved manganese, suspended manganese and suspended aluminum. The average value for dissolved iron was found to be 1.2 nM, with somewhat higher values at the Filchner Ice Shelf. The total iron was found to be considerably higher, with a range between 1 and 6 nM in the central Weddell Sea and 1 to 25 nM at the shelves. Transport of iron from the shelves into the Weddell Sea basin is demonstrated. This is observed both for total and dissolved iron. (Auth.)

J-46223

Nolting, R.F., De Baar, H.J.W., Van Bennekom, A.J., Masson, A., **Cadmium, copper and iron in the Scotia Sea, Weddell Sea and Weddell/Scotia Confluence (Antarctica),** *Marine chemistry,* Nov. 1991 35(1-4), Symposium on Biochemistry and Circulation of Water Masses in the Southern Ocean, July 1990. Proceedings. Edited by P. Tréguer and B. Quéguiner, p.219-243, 61 refs.

Until recently, little was known about trace metals in the southern ocean. Vertical profiles and surface water sections along 49W exhibit Cd concentrations of 0.2-0.8 nM, increasing with depth as for phosphate. A linear relationship between Cd and phosphate exists as in other oceans; however, the Cd/P slope at about 0.63-0.65 nM/*micro* M is much higher than the generally assumed global deep water ratio of about 0.35-0.4 nM/*micro*M. Dissolved Cu levels range from 1 to 4 nM, increasing with depth, as for silicate. The linear relationship between Cu and silicate shows the same linear trend as in the North Atlantic Ocean, except for the shallow (less than 100 m) antarctic waters. The South Orkneys shelf appears to be a source of dissolved Cu. Dissolved Fe levels range from 2 to 8 nM in the surface waters. Deep water Fe levels are similar. Over the South Orkneys shelf dissolved Fe is an order of magnitude higher (about 60 nM). Shelf sediments appear to be a major source for Fe; transport of weathered material by ice(bergs) may also contribute Fe to seawater. (Auth.)

J-46224

Smith, W.O., Jr., **Nutrient distributions and new production in polar regions: parallels and contrasts between the Arctic and Antarctic,** *Marine chemistry,* Nov. 1991 35(1-4), Symposium on Biochemistry and Circulation of Water Masses in the Southern Ocean, July 1990. Proceedings. Edited by P. Tréguer and B. Quéguiner, p.245-257, 37 refs.

This paper discusses the influences of nitrate and ammonium concentrations on nitrate uptake (and hence new production), particularly with regard to data collected within marginal ice zones in the Arctic and Antarctic. Subsurface ammonium maxima in waters over 150 m are frequently encountered in the Arctic and occasionally in the Antarctic. Such maxima result from the heterotrophic remineralization of organic matter, and because stratified environments occur more frequently in the Arctic, significant concentrations of ammonium accumulate as a result of lower diffusive losses. Causal agents (bacteria vs. zooplankton) may also be different in the Arctic from those in the Antarctic. Elevated ammonium concentrations significantly reduce nitrate uptake, and it is suggested that this nutrient interaction may play a significant role in controlling new production, particularly in open water regions. The new production of the southern ocean is estimated, and it is suggested that the production and flux from the surface layer is significant relative to the world's oceans. (Auth.)

J-46235

Liebezeit, G., Bölter, M., **Water-extractable carbohydrates in particulate matter of the Bransfield Strait,** *Marine chemistry,* Nov. 1991 35(1-4), Symposium on Biochemistry and Circulation of Water Masses in the Southern Ocean, July 1990. Proceedings. Edited by P. Tréguer and B. Quéguiner, p.389-398, 27 refs.

Water-extractable carbohydrates were determined in particulate material sampled in the Bransfield Strait in Dec. 1980. These compounds accounted on average for 1.3% of total organic carbon, although extreme values of 0.3 and 4.6% were encountered. Glucose was the dominant monosaccharide in this fraction, followed by other hexoses. Statistical data treatment results in four distinct regional clusters which only partly coincide with zonations defined from plankton observations. (Auth.)

J-46236

Dehairs, F., Stroobants, N., Goeyens, L., **Suspended barite as a tracer of biological activity in the southern ocean,** *Marine chemistry,* Nov. 1991 35(1-4), Symposium on Biochemistry and Circulation of Water Masses in the Southern Ocean, July 1990. Proceedings. Edited by P. Tréguer and B. Quéguiner, p.399-410, 29 refs.

During two cruises in the southern ocean (INDIGO 3, Indian sector and EPOS 2, Scotia-Weddell Confluence) suspended matter samples were collected for analysis of several biogenic elements including Ba, Si and particulate organic carbon (POC). The good agreement between particulate barium in subsurface water with oxygen minimum concentrations as well as with nitrate depletions suggests that it reflects the intensity of new production over the past season. As a consequence of new production in the southern ocean being performed mainly by diatoms, the occurrences of barite and diatoms are related in the water column. In areas characterized by diatom-poor phytoplankton, barite does occur, but in lower concentrations. (Auth.)

J-46237

Stroobants, N., **Barite formation in the southern ocean water column,** *Marine chemistry,* Nov. 1991 35(1-4), Symposium on Biochemistry and Circulation of Water Masses in the Southern Ocean, July 1990. Proceedings. Edited by P. Tréguer and B. Quéguiner, p.411-421, 24 refs.

The intensity of past biological activity can be correlated with the occurrence of suspended and sedimented barite ($BaSO_4$). During the EPOS-2 cruise (Nov.-Dec. 1988), situated in the Scotia Sea-Weddell Sea Confluence, suspended matter samples were taken for analysis of total Ba by ICP/AES and for SEM/EMP. The vertical profiles of particulate barium generally show a Ba maximum between 200 and 500 m. SEM-EMP investigations on Scotia-Weddell Sea Confluence profiles provide a possible explanation for the origin of this subsurface Ba maximum. In the surface waters (i.e. above 200 m) barite is mainly contained within large bioaggregates. In some cases high Ba concentrations are present in the first 10-20 m of the water column, occasionally coinciding with biomass parameter maxima. This correlation suggests active precipitation by the living phytoplankton cell (i.e. intravacuolar barite formation), as already observed by others for cultures of marine algae (Pavlovales). SEM/EMP investigations on INDIGO 3 and EPOS-2 samples did not reveal any association of barite with identifiable phytoplankton individuals. Thus, SEM/EMP evidence favors passive precipitation in saturated microenvironments as the process involved in formation of pelagic barite. (Auth. mod.)

J-46238

Van Bennekom, A.J., Buma, A.G.J., Nolting, R.F., **Dissolved aluminium in the Weddell-Scotia Confluence and effect of Al on the dissolution kinetics of biogenic silica,** *Marine chemistry,* Nov. 1991 35(1-4), Symposium on Biochemistry and Circulation of Water Masses in the Southern Ocean, July 1990. Proceedings. Edited by P. Tréguer and B. Quéguiner, p.423-434, 32 refs.

In the Scotia and Weddell Seas the concentration of dissolved Al was 1-1.5 nM in ice-free surface waters, up to 3 nM in ice-covered waters and about 2.6 nM in bottom waters. The solubility and the dissolution rate of diatomaceous silica, obtained from net samples and from incubations in the presence or absence of dissolved Al, were inversely related to solid-phase Al/Si ratios. At *in situ* temperatures, dissolution rates for antarctic diatoms are higher than those for diatoms from temperate regions. Effects on distribution patterns of silicic acid in the Weddell Sea are discussed. (Auth.)

J-46239

Leynaert, A., Tréguer, P., Quéguiner, B., Morvan, J., **Distribution of biogenic silica and the composition of particulate organic matter in the Weddell-Scotia Sea during spring 1988,** *Marine chemistry,* Nov. 1991 35(1-4), Symposium on Biochemistry and Circulation of Water Masses in the Southern Ocean, July 1990. Proceedings. Edited by P. Tréguer and B. Quéguiner, p.435-447, 27 refs.

During EPOS 2, Nov. 26, 1988-Jan. 5, 1989, the distribution of biogenic silica (BSi) was determined from the surface to 600 m along two transects (49W and 47W) spanning the Scotia Sea, the Weddell-Scotia Confluence (WSC) and the marginal ice zone (MIZ) of the Weddell Sea. Particulate organic carbon (POC), particulate organic nitrogen (PON) and chlorophyll *a* concentrations were determined in parallel in surface (10 m) samples. In the 0-100 m layer, the distribution of particulate showed little correlation with the meltwater field in late Nov. High BSi concentrations were measured at the end of Nov. in the WSC and early in Jan. in the ACC where the wind-mixed layer was only 35 m, creating favorable conditions for phytoplankton growth. However, maximum and mean biogenic silica values remained fairly low as compared with those reported for the Ross Sea. This relatively low silica content of the 0-100 m layer appears to be mainly due to intense grazing which resulted in rapid export of particulate material towards the deeper layers. The mean POC/PON molar ratio was 5.5, i.e. significantly lower than the usual Redfield ratio. BSi/POC molar ratios ranged from 0.01 to 0.61, the highest values being found in the Scotia Sea, where siliceous phytoplankton was dominant. The high BSi/POC ratios confirm that diatoms in the antarctic ocean are able to incorporate unusually high amounts of Si relative to carbon, as compared with other ecosystems. (Auth.)

J-46243

DeMaster, D.J., Nelson, D.M., Harden, S.L., Nittrouer, C.A., **Cycling and accumulation of biogenic silica and organic carbon in antarctic deep-sea and continental margin environments,** *Marine chemistry,* Nov. 1991 35(1-4), Symposium on Biochemistry and Circulation of Water Masses in the Southern Ocean, July 1990. Proceedings. Edited by P. Tréguer and B. Quéguiner, p.489-502, 25 refs.

Rates of biogenic silica and organic carbon accumulation are reported for antarctic deep-sea and continental margin deposits. Naturally occurring radionuclides (Ra-226, Pa-231, and Th-230) were used to establish rates of sediment accumulation in the rapidly accumulating siliceous deposits beneath the Antarctic Polar Front. The rates were as high as 20-180 cm/ka, and when coupled with biogenic silica and organic carbon measurements, yield accumulation rates as high as 35 mg/sq cm/yr for silica and 0.3 mg/sq cm/yr for organic carbon. SiO_2/organic C weight ratios in Polar Front sediments are typically about 100, although values as high as 300 were measured. Considering that the SiO_2/organic C ratio in Polar Front plankton ranges from 0.5 to 2, the high ratios observed in Polar Front sediments indicate that during settling and burial an enrichment of 50 to 600-fold occurs in biogenic silica relative to organic carbon. Approximately 25-50% of the gross silica production in surface waters is preserved in the seabed, in contrast to less than 5% of the organic carbon. In some of the continental margin environments, lateral transport of biogenic material can create local areas where the rate of silica accumulation is as much as 70% of the production in the overlying water column. In the southern ocean environments examined in this study, biogenic silica is preferentially preserved in the sedimentary record relative to organic carbon. This trend is consistent with the greater role of southern ocean deposits in the global silica cycle as compared with the organic carbon cycle. (Auth. mod.)

J-46244

Abelmann, A., Gersonde, R., **Biosiliceous particle flux in the southern ocean,** *Marine chemistry,* Nov. 1991 35(1-4), Symposium on Biochemistry and Circulation of Water Masses in the Southern Ocean, July 1990. Proceedings. Edited by P. Tréguer and B. Quéguiner, p.503-536, Refs. p.533-536.

The flux of diatom valves and radiolarian shells obtained during short-term and annual sediment trap experiments at localities in the Atlantic sector of the antarctic ocean (Drake Passage, Bransfield Strait, Powell Basin, NW and SE Weddell Sea and the Polar Front north of Bouvet I.) is summarized and discussed. The deployment of time-series sediment traps provided annual flux records between 1983 and 1990. The biosiliceous particle flux is characterized by significant seasonal and interannual variations. Interannual differences in the particle flux range over a factor of 10. Grazers play an important role in controlling the quantity, timing and pattern of the vertical biosiliceous particle flux. During their transfer through the water column to the ocean floor, the composition of the biosiliceous particles is altered mechanically (breakdown by grazing zooplankton) and by dissolution, which significantly affects especially diatoms and phaeodarians in the upper portion of the water column and at the sediment-water interface. Significant lateral transport of suspended biosiliceous particles was observed in the bottom water layer in regions adjacent to shelf areas (Bransfield Strait), and in the vicinity of topographic elevations (Maud Rise), indicating considerable redistribution of biogenic silica in these regions. (Auth. mod.)

J-46245

Bareille, G., **Biogenic silica accumulation rate during the Holocene in the southeastern Indian Ocean,** *Marine chemistry,* Nov. 1991 35(1-4), Symposium on Biochemistry and Circulation of Water Masses in the Southern Ocean, July 1990. Proceedings. Edited by P. Tréguer and B. Quéguiner, p.537-551, 33 refs.

Three box-core transects were selected in the southeastern Indian Ocean to establish the variability of biogenic silica accumulation rate in the main subsystems of the southern ocean. *Cycladophora davisiana* and *delta*O-18 chronologies, previously calibrated by C-14 dates, and biogenic silica contents determined by X-ray diffraction analysis, were used to calculate accumulation rates. Concurrently, a transfer function was used to quantify the silica loss during the biogenic particulate accumulation in the deep-sea sediments. The average rate of biogenic silica rain on the sea-floor, calculated from the accumulation rate and the amount of dissolved biogenic silica, ranges from less than 0.1 to 16 g opal/sq cm k/a. During the Holocene, biogenic silica has accumulated at the highest rates on the Southeast Ridge, south of the Polar Frontal Zone. To the north and south, the accumulation rate drops where summer sea surface temperatures are above 8 C or lower than 2 C. Biogenic silica dissolution is maximum in the marginal sea ice zone. Accumulation rates of biogenic silica can be a useful index to estimate changes of palaeoproductivity in the southeastern Indian Ocean, although there is no strict proportionality between accumulation and silica rain rates. (Auth.)

J-46246

Van der Loeff, M.M.R., Berger, G.W., **Scavenging and particle flux: seasonal and regional variations in the southern ocean (Atlantic sector),** *Marine chemistry,* Nov. 1991 35(1-4), Symposium on Biochemistry and Circulation of Water Masses in the Southern Ocean, July 1990. Proceedings. Edited by P. Tréguer and B. Quéguiner, p.553-567, 48 refs.

Even with large variations in flux rates, the scavenging of Pb and Th remains closely coupled to particle flux. In the Bransfield Strait, more than 9% of the scavenging of Th-230 and Pb-210 occurs in two productive months, followed by negligible fluxes in winter. In winter, total Th-234 reaches equilibrium with its parent U-238. During the bloom period, it is rapidly adsorbed onto particles and removed from the surface water. Notwithstanding the short production period, the annual fluxes of Th-230xs and Pb-210xs (the subscript xs designates unsupported value) exceed their respective production rates in the water column by 60%. Pb-210xs inventories in the sediment reflect the distribution of average present-day particle flux: high inventories occur in a zone just south of the Polar Front, including the Bransfield Strait and Drake Passage; low inventories are found north of the Polar Front and in the Weddell Sea, with minimum values (4-5 dpm/sq cm) in the central Weddell Gyre. This distribution is in agreement with data for primary production and oxygen penetration in the sediment. However, inventories are determined not only by particle fluxes but also by sediment focusing and hydrography. A general relationship between radionuclide fluxes and particle rain rates as a tool for hindcasting palaeoproductivities cannot be given. (Auth.)

J-46247

Schlüter, M., **Organic carbon flux and oxygen penetration into sediments of the Weddell Sea: indicators for regional differences in export production,** *Marine chemistry,* Nov. 1991 35(1-4), Symposium on Biochemistry and Circulation of Water Masses in the Southern Ocean, July 1990. Proceedings. Edited by P. Tréguer and B. Quéguiner, p.569-579, 21 refs.

The flux of reactive organic carbon (Corg) into sediments of the southern and eastern Weddell Sea was estimated by modelling measured oxygen and nitrate pore-water profiles. Highest flux of reactive organic carbon into the sediment was calculated for the shelf region (500 and 600 mmol C/sq m/yr, whereas for pelagic and continental slope sediments Corg fluxes of less than 60 mmol C/sq m/yr and 100-200 mmol C/sq m/yr respectively were calculated. The oxygen penetration depth (OPD) ranged from less than 2 cm in shelf sediments to much greater than 40 cm in pelagic sediments. For the first time, sediments covered by the Filchner Ice Shelf (probably cut off from a source of primary production for a few decades) were sampled. In this area a restricted vertical flux of reactive organic carbon was expected. However, the Corg content of these sediments was as high as that of antarctic shelf sediments, which suggests lateral transport of organic matter. In contrast, pore-water profiles and calculated reactive organic carbon fluxes off Filchner Ice Shelf are similar to those of much deeper depositional environments (3000-4000 m water depth). (Auth.)

J-46248

Fischer, G., **Stable isotope ratios of plankton carbon and sinking organic matter from the Atlantic sector of the southern ocean,** *Marine chemistry,* Nov. 1991 35(1-4), Symposium on Biochemistry and Circulation of Water Masses in the Southern Ocean, July 1990. Proceedings. Edited by P. Tréguer and B. Quéguiner, p.581-596, 44 refs.

The stable carbon isotope composition of particulate organic carbon (POC) from plankton, sediment trap material and surface sediments from the Atlantic sector of the southern ocean were determined. Despite low and constant water temperatures, large variations in the *delta*C-13 values of plankton were measured. C-13 enrichments of up to 100 per mill coincided with a change in the diatom assemblage and a two-fold increase in primary production. Increased CO2 consumption as a result of rapid carbon fixation may result in diffusion limitation reducing the magnitude of the isotope fractionation. The *delta*C-13 values of plankton from sea-ice cores display a relationship with the chlorophyll *a* content. High 'ice-algae' biomass, in combination with a limited exchange with the surrounding seawater, results in values of about -18 to -20 per mill. It is assumed that these values are related to a reduced CO2 availability in the sea-ice system. In comparison with plankton, sinking krill faeces sampled by traps can be enriched by 2-5 per mill in C-13 (e.g. central

Bransfield Strait). In contrast, the transport of particles in other faeces, diatom aggregates or chains results in minor isotope changes (e.g. Drake Passage, Powell Basin, NW Weddell Sea). A comparison between the *delta*C-13 values of sinking matter and those of surface sediments reveals that C-13 enrichments of up to 3-4 per mill may occur at the sediment-water boundary layer. These isotopic changes are attributed to high benthic respiration rates. (Auth.)

J-46249

Wefer, G., Fischer, G., **Annual primary production and export flux in the southern ocean from sediment trap data,** *Marine chemistry,* Nov. 1991 35(1-4), Symposium on Biochemistry and Circulation of Water Masses in the Southern Ocean, July 1990. Proceedings. Edited by P. Tréguer and B. Quéguiner, p.597-613, 46 refs.

Since 1983, time-series traps have been deployed in the Atlantic sector of the southern ocean to measure the flux of organic carbon, biogenic silica and carbonate. The organic carbon flux data are used to calculate primary production rates and organic carbon fluxes at 100 m water depth. From these calculations, annual primary production rates range from about 170 gC/sq m in the coastal area (Bransfield Strait) to almost zero in the Permanent Sea-Ice Zone. High rates (of about 80 gC/sq m/yr) were calculated for the Polar Front Zone and rather low values (about 20 gC/sq m/yr) characterize the Maud Rise area. The estimated primary production for the entire southern ocean (south of 50S), using various subsystems with characteristic carbon fluxes, is on the order of 1 billion tons/yr; the organic carbon flux out of the photic layer is 170 million tons/yr. The authors' calculation of the southern ocean total annual primary production is substantially lower than previously reported values. (Auth.)

J-46250

Treguer, P., **Conclusions of the symposium,** *Marine chemistry,* Nov. 1991 35(1-4), Symposium on Biochemistry and Circulation of Water Masses in the Southern Ocean, July 1990. Proceedings. Edited by P. Tréguer and B. Quéguiner, p.615-619.

Two key questions emerge from the papers and discussions presented at this meeting: is the southern ocean a contemporary sink or source for atmospheric CO2; and in previous glacial-interglacial climate change, did the southern ocean lead climate change, or did it follow it? Following these, it is clear that the southern ocean cannot be considered as a single functional unit. In the perspective of modelling fluxes by biogenic matter, five functional areas of the southern ocean are outlined: frontal systems including the Polar Front Zone (PFZ), Permanently Open Ocean Zone (POOZ), Seasonal Sea-Ice Zone (SIZ), Coastal and Continental Shelf Zone (CCSZ) and the Zone of the Islands (IZ). Several talks also highlighted the variability within smaller areas, and clearly such patchiness also needs to be quantified. (Auth.)

J-46261

Smith, W.O., Jr., Kelly, H.P., Rich, J.H., **Chlorophyll distribution and primary productivity in the Ross Sea, austral summer 1990,** *Antarctic journal of the United States,* 1990 25(5), p.179-182, 7 refs.

Phytoplankton distribution and primary productivity were measured in samples collected from Jan. 12 to Feb. 10, 1990, along two transects perpendicular to the ice edge and the Victoria Land coastline, in the Ross Sea. The study tested whether a latitudinal gradient in surface biomass and productivity exists. Results show elevated chlorophyll concentrations throughout the region. Primary productivity was also very high. Vertical distribution of density and chlorophyll in micrograms/l along the southern and northern transects, respectively, are shown in figures. It is concluded that such a large productivity indicates that during the summer season, large amounts of biogenic matter are potentially available for export to subeuphotic depths and to the underlying sediments.

J-46275

Ferreyra, G.A., Alder, V.A., **Daily variability of phytoplankton and oceanographic parameters during the fall in Arthur Harbor,** *Antarctic journal of the United States,* 1990 25(5), p.208-209, 8 refs.

A survey of several biological and physicochemical parameters was carried out in Arthur Harbor from Mar. 21 to Apr. 22, 1990. The study focused on the high-frequency temporal variability of phytoplankton at the end of the fall growth period. Throughout the study, chlorophyll *a* values decreased consistently, in agreement with decreasing incident radiation, temperature and pH. The decrease in pH values is interpreted as reflecting a transition from a situation dominated by primary productivity to one where heterotrophic activity became increasingly important. Results suggest a high degree of adaptability of the dominant phytoplankton assemblages to the adverse light conditions characteristic of the late fall.

J-46286

Nelson, D.M., Smith, W.O., Jr., **Sverdrup revisited: critical depths, maximum chlorophyll levels, and the control of southern ocean productivity by the irradiance-mixing regime,** *Limnology and oceanography,* Dec. 1991 36(8), p.1650-1661, 51 refs.

A reformulation of Sverdrup's critical-depth calculation, using recent optical and physiological information, is developed and applied to data from the southern ocean. Comparisons between calculated critical depths (Zc) and mixed-layer depths (Zm) indicate that both the marginal ice zone and the open waters of the Antarctic Circumpolar Current provide favorable irradiance-mixing regimes for the initiation and early development of phytoplankton blooms in summer, i.e. $Zc > Zm$ when phytoplankton biomass is low and the water clear; that when ice-edge blooms develop, Zc shoals to depths about equal to Zm, implying that phytoplankton standing stocks in ice-edge blooms may be self-limiting as a result of reduced penetration of irradiance; and that the highest chlorophyll levels that can be sustained in summer in open waters not stabilized by meltwater are 1.0 microgram/liter in the Weddell and Scotia Seas, and may be less in areas that experience stronger winds. (Auth.)

J-46287

Mitchell, B.G., **Light limitation of phytoplankton biomass and macronutrient utilization in the southern ocean,** *Limnology and oceanography,* Dec. 1991 36(8), p.1662-1677, 72 refs.

The Antarctic Circumpolar Current (ACC) is unique in that it has continually high concentrations of major plant nutrients but low phytoplankton biomass. This enigmatic phenomenon is the focus of significant speculation that trace nutrients, including Fe, may limit phytoplankton crop size. Global climatologies indicate that the ACC is a region with low surface temperatures, weak density stratification, little summertime surface solar irradiance, and strong wind stress. These physical phenomena act to limit growth rates of the phytoplankton community. Using a photophysiological description of phytoplankton growth in a simple one-dimensional ecosystem model forced by observations or climatologies of mixing depth and surface irradiance, an evaluation is made of the potential for massive, nutrient-exhausting, phytoplankton blooms forming in the ACC. The ACC has persistent mixed layers in excess of 50 m. Literature values and model optimization indicate that the minimal aggregate specific loss rate for phytoplankton, including respiration, sinking, and grazing, is 0.2/d. For a minimal loss rate and typical physical conditions of stratification and surface irradiance, the model predicts that phytoplankton in the ACC would not utilize over 10% of the available macronutrients. Without a mechanism for increasing the strength of stratification, the authors predict that massive Fe additions to the southern ocean would fail to significantly mitigate the atmospheric CO2 derived from fossil fuel. (Auth.)

J-46288

Dugdale, R.C., Wilkerson, F.P., **Low specific nitrate uptake: a common feature of high-nutrient, low-chlorophyll marine ecosystems,** *Limnology and oceanography,* Dec. 1991 36(8), p.1678-1688, 54 refs.

A search was made for common features of three high-nutrient, low-chlorophyll (HNLC) regions of interest in the southern ocean, the eastern equatorial Pacific, and Station P in the northeast Pacific. In each of these areas, the rates of specific NO3 uptake, whether normalized to particulate organic nitrogen (PON) or chlorophyll, are low compared to coastal upwelling systems with comparable nutrient concentrations. One possible reason for the lack of high VN-15O3 values in the HNLC regions is that seeding of the large, fast-growing, fast-sinking diatoms is inadequate, and primarily due to the lack of a bottom or other recirculation system to assure a supply of these diatoms to the surface regions. Grazing control limits biomass development and may function to hold VN-15O3 to low values resulting in conditions certain to appear as HNLC. Comparison with model results suggests that deep mixed layers in the southern ocean and at Station P may limit VN-15O3. Strong dependence on temperature of N and C uptake in psychrophilic antarctic phytoplankton and sea-ice algae may be a dominant factor in constraining VN-15O3 to low values in the southern ocean. (Auth. mod.)

J-46289

Martin, J.H., Gordon, R.M., Fitzwater, S.E., **Case for iron,** *Limnology and oceanography,* Dec. 1991 36(8), p.1793-1802, 25 refs.

Excess major nutrients occur in offshore areas ranging from the tropical equatorial Pacific to the polar Antarctic. In spite of the great ecological differences in these environments, the authors believe they share a common trait: iron deficiency. Presented here is the case for iron; it is pointed out that all of these areas are far from Fe-rich terrestrial sources and that atmospheric dust loads in these regions are amongst the lowest in the world. A summary is given of experiments performed in three nutrient-rich areas: the Gulf of Alaska, the Ross Sea, and the equatorial Pacific. In general, populations without added Fe doubled at rates 11-40% of the expected maxima at various temperatures. The addition of nanomole quantities of Fe increased these doubling rates by factors of 2-3. In spite of the lack of Fe, tightly coupled phytoplankton/zooplankton communities seem to inhabit these major nutrient-rich areas. Since Fe is required for the synthesis of chlorophyll and nitrate reductase, little chlorophyll is found and NH3 is the favored N source. Normal rate values of specific productivity indicate that these populations are healthy, but limited by the insufficient Fe supply. When Fe becomes available either artificially in bottle experiments or in the environment as Fe-rich land masses are approached, diatoms quickly bloom, chlorophyll levels increase, and nutrient stocks are rapidly depleted. These combined results indicate that Fe availability is the primary factor controlling phytoplankton production in nutrient-rich areas of the open seas. (Auth.)

J-46298

Handa, N., Nakatsuka, T., Fukuchi, M., Hattori, H., Hoshiai, T., **Vertical fluxes and ecological significance of organic materials during the phytoplankton bloom during austral summer in Breid Bay, Antarctica,** *Marine biology,* Mar.1992 112(3), p.469-478, 54 refs.

A mooring system consisting of an *in situ* fluorometer at a depth of 50 m and a time-series sediment trap at a depth of 110 m was deployed at the sediment trap site (70 deg 11.536 secS; 24 deg 18.679 secE; water depth: 300 m) in Breid Bay from Dec. 28, 1985 to Feb. 13, 1986. Sinking particles, consisting of diatoms (mainly *Thalassiosira antarctica),* were analyzed for organic materials, stable carbon and nitrogen isotopes. Vertical fluxes of organic carbon and nitrogen were determined to be within the ranges of 12.3 to 116 mg C/sq m/d and 1.79 to 15.4 mg N/sq m/d, respectively, with maxima in the middle of Jan. 1986, after which time the organic carbon and nitrogen fluxes tended to decrease with a steep gradient. Fifteen species of protein amino acids with trace amounts of *beta*-alanine, *gamma*-aminobutyric acid and ornithine were found in the sinking particles upon acid hydrolysis, but the amino acid composition of these samples had not been affected much by biological agents. The essential amino acid index was calculated for the sinking particles collected in the course of the sediment trap experiment. The indices obtained indicated that the sinking particles collected in Breid Bay were more ecologically significant than the sinking and suspended particles from deep waters. (Auth. mod.)

J-46301

Mitchell, B.G., **Predictive bio-optical relationships for polar oceans and marginal ice zones,** *Journal of marine systems,* Mar. 1992 3(1-2), p.91-105, Refs. p.104-105.

An analysis of more than 500 stations from polar seas was undertaken to evaluate predictive models linking *in situ* phytoplankton pigment concentrations to measurable optical parameters. The data set consists of profiles of spectral downwelling irradiance, upwelling radiance, chlorophyll and phaeopigments from 3 cruises to the Antarctic Peninsula, one cruise to the Barents Sea and one cruise to Fram Strait in the Greenland Sea. The pigment-specific diffuse attenuation coefficient for polar regions is significantly smaller, particularly in the blue region of the spectrum, than previous statistical models for temperate oceans predict. Phytoplankton remote sensing pigment retrieval algorithms show significant differentiation from temperate ocean models. The presently recommended water-leaving radiance algorithm for Coastal Zone Color Scanner data processing underestimates surface pigment concentrations by more than a factor of two for the polar observations reported here. The observations are interpreted in the context of variations in pigment-specific particulate absorption which have been described elsewhere. Specifically, the magnitude of pigment-specific absorption coefficient in the blue is hypothesized to be smaller for polar regions due to significant pigment packaging effects, and a relatively small amount of detrital absorption compared to phytoplankton absorption. Implications for remote sensing of phytoplankton pigments and pigment-based models of light propagation in the ocean are discussed. (Auth. mod.)

J-46303

Muench, R.D., **Weddell-Scotia marginal ice zone: physical oceanographic conditions, geographical and seasonal variability,** *Journal of marine systems,* Mar. 1992 3(1-2), p.169-182, 22 refs.

Physical oceanographic conditions were measured in the Weddell and Scotia Sea marginal ice zones (MIZ's) during 1983, 1986 and 1988. The field work encompassed spring, autumn and mid-winter periods and included retreating, advancing and steady-state ice edges. Observed upper ocean structures, which typify MIZ's and reflect input of low salinity water from melting ice, included low salinity layers, lenses and fronts. An upper mixed layer was always present and was generally more fully developed in autumn and winter than at other times of year. Conditions in the deeper waters reflected regional oceanographic processes, and significant differences were present between the Weddell and Scotia Seas. The colder, denser Weddell water appeared to have mixed isopycnally with deeper water in the Scotia Sea, present there at depths exceeding 500 m. The Scotia Sea was dominated by strong gradients and energetic mesoscale features, with currents exceeding 50 cm/s. The northwestern Weddell Sea had, in contrast, current speeds well below about 5 cm/s and small to negligible lateral water property gradients. These observations suggest that the Weddell western boundary current was weaker than has been estimated in the past. In addition, scant evidence was found of deep winter convection in the Scotia Sea, a process which has been hypothesized in the past to contribute to deep water formation. No evidence was found during winter 1988 in the Scotia Sea of the modified water known as Weddell-Scotia Confluence water. (Auth. mod.)

J-46357

Broecker, W.S., Peng, T.H., **Interhemispheric transport of carbon dioxide by ocean circulation,** *Nature,* Apr. 16, 1992 356(6370), p.587-589, 19 refs.

Although anthropogenic emissions of carbon dioxide have today created a greater atmospheric CO2 concentration in the Northern than in the Southern Hemisphere, a comparison of interhemispheric CO2 profiles from 1980 and 1962 indicated that before the Industrial Revolution, natural CO2 sources and sinks acted to set up a reverse (south to north) gradient which drove about one gigatonne of carbon each year through the atmosphere from the Southern to the Northern Hemisphere. At steady state, this flux must have been balanced by a counter flow of carbon from north to south through the ocean. Presented here is a means to estimate this natural flux by a separation of oceanic carbon anomalies into those created by biogenic processes and those created by CO2 exchange between the ocean and atmosphere. Before the Industrial Revolution, deep water formed in the northern Atlantic Ocean carried about 0.6 gigatonnes of carbon annually to the Southern Hemisphere. The existence of this oceanic carbon pump also raises questions about the need for a large terrestrial carbon sink in the Northern Hemisphere to balance the present global carbon budget. (Auth. mod.)

J-46378

Dehairs, F., Goeyens, L., Stroobants, N., Mathot, S., **Elemental composition of suspended matter in the Scotia-Weddell Confluence area during spring and summer 1988 (EPOS Leg 2),** *Polar biology,* Apr. 1992 12(1), EPOS European Polarstern Study, Proceedings. No.1, p.25-33, Refs. p.32-33.

During spring and summer 1988 the upper 500 m of water column in the Scotia-Weddell Confluence was sampled for the elemental composition of total suspended matter. For particulate organic carbon, surface water concentrations ranged between 2.5 and 15 micromol/l, with an estimated 19 to 47% of this pool being detrital carbon. In late Nov., the highest surface water particulate organic carbon concentrations occurred in the Confluence area where they coincided with a maximum in particulate Si. Later in the season, particulate Si in the Confluence area decreased. In the Scotia Sea, surface water particulate Si increased with time. For particulate Ca and Sr in surface water, strong gradients are observed across the Scotia Front, with highest concentrations in the Scotia Sea. In the Scotia Sea, heavily calcified coccolithophorids and diatoms occurred throughout the season, while in the Confluence area heavily calcified coccolithophorids were absent and a switch-over from diatom to naked flagellate dominance was observed following a krill event. In the surface waters, the lithogenic Si fraction represents on average only 4% of the total particulate Si content. However, this fraction reaches 60% below 100 m depth in the Confluence area, due mainly to the presence of a subsurface maximum in the aluminosilicate load. Subsurface Ba/barite concentrations are highest in the Scotia Sea and decrease through the Scotia Front. (Auth. mod.)

J-46383

Cadée, G.C., González, H.E., Schnack-Schiel, S.B., **Krill diet affects faecal string settling,** *Polar biology,* Apr. 1992 12(1), EPOS European Polarstern Study, Proceedings. No.1, p.75-80, Refs. p.79-80.

Free-floating sediment traps used on a transect from the Scotia Sea to Weddell Sea collected larger and more degraded krill faecal strings in the deeper (150 m) than in 50 or 75 m traps. The smallest faecal strings were only present in the shallower traps. Sinking velocity of smaller faecal strings was, as expected, much lower than for larger ones, with a total range of 50 to 800 m/day for faecal string volumes of 0.007 to 0.53 cu mm. Krill feeding largely on diatoms produced faeces with higher settling velocity than those feeding on non-diatom phytoplankton. Smaller krill faecal strings do not leave the upper mixed layer. Potential settling velocities as measured in settling tubes (without turbulence) may in this respect be misleading. Small oval faecal pellets of unknown origin showed relatively high settling velocities (80 to 250 m/day for 0.002 to 0.013 cu mm) due to higher compaction and lower form resistance to sinking. (Auth.)

J-46384

González, H.E., **Distribution and abundance of krill faecal material and oval pellets in the Scotia and Weddell Seas (Antarctica) and their role in particle flux,** *Polar biology,* Apr. 1992 12(1), EPOS European Polarstern Study, Proceedings. No.1, p.81-91, Refs. p.90-91.

The abundance and depth distribution of zooplankton faeces in spring to early summer were investigated along meridional transects that extended from the Scotia Sea across the Weddell-Scotia Confluence and into the Weddell Gyre. Krill faecal strings and oval faecal pellets of unknown origin were by far the most important zooplankton faeces, and highest concentrations were always found in the Confluence, often close to the ice border. Krill faeces were usually more abundant in the uppermost layer (0-50 m) where they contributed an average of 130 micrograms dry weight/cu m. There was an exponential decrease with depth. Oval pellets were more evenly distributed in the upper 1000 m of the water column, with an average of 9 micrograms dry weight/cu m. Consecutive collections (day-night) of krill faeces using drifting sediment traps showed that only the larger strings sank from 50 to 150 m depth. Peritrophic membranes appeared to deteriorate during sinking. Diatoms (in particular *Nitzschia* and *Thalassiosira* spp.) contributed by far the bulk of material in krill and oval faeces. In samples collected near or under the pack ice, remains of crustaceans in both krill- and oval faeces were also found. (Auth. mod.)

J-46396

Burton, D., Moore, G.J., Fitzgerald, W.J., **Bayesian model selection and parameter estimation,** Signal Processing V. Theories and Applications. EUSIPCO-90, European Signal Processing Conference, 5th, Barcelona, Spain, Sep. 18-21, 1990. Proceedings. Vol.1, Amsterdam, Elsevier, 1990, p.221-224, 6 refs.

DLC TK5102.5.E9

A Bayesian model selection and parameter estimation algorithm is introduced for use in analyzing sea floor pressure variation. The use of Bayes theorem allows the inclusion of prior information regarding the models and model parameters, and permits the removal of parameters which are of no interest. Examples are the inclusion of the noise autocorrelation function for the case of non-Gaussian noise and the removal of the amplitude and phase information from sinusoidal model functions. These techniques are applied to the analysis of artificial transients in short data records and the analysis of an original time series consisting of 383 hourly measurements of the sea floor pressure beneath the Bellingshausen Sea, Antarctica. (Auth.)

J-46398

Marsh, J.G., **Global mean sea surface based upon GEOS 3 and Seasat altimeter data,** *Journal of geophysical research,* Apr. 10, 1992 97(B4), p.4915-4921, 21 refs.

A mean sea surface relative to the International Union of Geodesy 1980 Geodetic Reference System reference ellipsoid has been derived from Seasat and GEOS 3 altimeter measurements. This surface, called MSS-9012, has been computed on a grid of 1/8 deg resolution. Each elevation value was calculated by fitting all data within 111 km to a local biquadratic surface using Bayesian least squares. Individual data points were weighted inversely to the square of the distance to the grid location in the gridding process. The surface covers the global ocean between 70N and 72S. In the vicinity of sea ice the altimeter heights have been corrected for the on-board tracker error that occurs over non-Gaussian surfaces. Comparisons are made between MSS-9012 and ocean bathymetry. The combination of data from the two satellites has successfully retrieved more information about the sea surface than was previously possible using only Seasat data. (Auth. mod.)

J-46408
Moran, S.B., Moore, R.M., Westerlund, S., **Dissolved aluminum in the Weddell Sea,** *Deep-sea research,* Mar./Apr. 1992 39(3/4A), p.537-547, 33 refs.

Vertical profiles of dissolved aluminum (Al) at 5 stations in the Weddell Sea are presented; concentrations range from 1 to 5 nM, considerably lower than Al levels in the Atlantic, typically in the 10-40 nM range, and similar to levels of 0.06-6 nM reported for the Pacific. The slight maximum in dissolved Al (4-5 nM) in the surface waters is suggested to be derived primarily from the partial dissolution of atmospheric dust. Minimum concentrations of dissolved Al (1-1.6 nM) are observed at intermediate depths (1500-3000 m). The slight increase in dissolved Al of about 2 nM with proximity to the sediment-water interface implies that sediments are not a significant source of dissolved Al to the deep waters. The combination of the low atmospheric input and the seasonally high rate of primary productivity that characterize the southern ocean can account for the low concentrations of dissolved Al in the Weddell Sea. The results reported in this study suggest that the low Al levels in the deep North Pacific can be explained by advection of low-Al source waters originating in the Weddell Sea. (Auth.)

J-46419
Keir, R.S., **Effect of vertical nutrient redistribution on surface ocean *delta* C-13,** *Global biogeochemical cycles,* Dec. 1991 5(4), p.351-358, 31 refs.

Processes that shift nutrients from mid to lower ocean depths may or may not increase the ocean's vertical carbon pump. Redistribution of *delta* C-13 produced by these processes is compared in two box models: a vertical three-box ocean and a thirteen-box ocean. In the former there is no *delta* C-13 fractionation laterally between surface waters, and the ocean nutrient and *delta* C-13 distributions are linearly correlated. This correlation is not changed when these tracers become redistributed, and if the model surface ocean is nutrient limited, the surface *delta* C-13 cannot change. In the 13-box ocean there is a transfer of negative *delta* C-13 from the cold surface water through the atmosphere into the warm ocean. Its *delta* C-13 is therefore lower than it would be as a result of the carbon pump by itself. If a mid-depth nutrient depletion occurs because of lower nutrients in antarctic waters, the warm surface *delta* C-13 increases. If the vertical nutrient shift occurs because of ocean circulation or biological recycling changes, the warm surface water *delta* C-13 change depends on the ratio of its vertical CO2 fluxes, i.e., exchange of atmospheric CO2 versus upwelling total CO2 and net biological production. If this ratio remains about the same, then little change occurs in surface *delta* C-13, and the *delta* C-13 of Pacific deep water decreases about 0.3 per mill. In this case, no change in the average ocean *delta* C-13 is required to explain observations from sediment data. This would imply that the ice age land biota carbon mass was about the same as that of today. The vertical CO2 flux ratio could be an important consideration if greater wind-driven upwelling is a factor in the nutrient redistribution. (Auth.)

J-46422
Bohrmann, G., Spiess, V., Hinze, H., Kuhn, G., **Reflector "Pc" a prominent feature in the Maud Rise sediment sequence (eastern Weddell Sea): occurrence, regional distribution and implications to silica diagenesis,** *Marine geology,* Apr. 1992 106(1/2), p.69-87, 29 refs.

Condensed pelagic deposits characterize the uppermost sediment sequence of the Maud Rise in the eastern Weddell Sea. The comparison of subbottom profiling data with the sediments drilled at two ODP sites shows that Lithologic Unit Ib deposited during late Miocene to late Pliocene times is generally characterized by acoustic transparency. A prominent reflector with strongly increased amplitude (called Reflector "Pc") occurs within this mainly homogeneous diatom ooze unit and is correlated with the porcellanite horizon found at ODP Site 689. As evidenced by sediment findings, Reflector "Pc" marks a distinct stratigraphic layer of early Pliocene age. The development of the Reflector "Pc" and its amplitude of reflection in the echosounding records is most likely caused by the silica cementation of porcellanite within this layer. In large areas of the central Maud Rise, a patchy but also continuous distribution of Reflector "Pc" was found. On average Reflector "Pc" is detected around 11 and 12 m below seafloor, but depth occurrence is highly variable within the range of 8 m to more than 18 m. The apparent amplitude of Reflector "Pc" is higher in those areas where the diatom ooze Unit Ib reaches greater thicknesses, which may be caused by local enhanced tectonic subsidence. In general a good correlation of Reflector "Pc" amplitude and thickness of lithologic Unit Ib is observed. (Auth. mod.)

J-46426
Shemesh, A., Charles, C.D., Fairbanks, R.G., **Oxygen isotopes in biogenic silica: global changes in ocean temperature and isotopic composition,** *Science,* June 5, 1992 256(5062), p.1434-1436, 20 refs.

A record of oxygen isotopes in biogenic silica from a deep-sea sediment core from the southern ocean reveals that marine diatoms retain their primary isotopic composition after burial. As a result, the marine diatom record can be combined with data on coexisting planktonic foraminifera to monitor past surface temperature and isotopic composition of seawater. The coupling of these two records allows the solution of two paleotemperature equations for each core interval. Data from a South Atlantic core show that the average *delta* O-18 during the glacial period at this site was higher by about 1.3 per mill than average Holocene values, and that average glacial- age temperatures were not significantly different from average Holocene values. (Auth.)

J-46446
Sun, H., **Variation characteristics of summer bottom water temperature in the Great Wall Bay, Antarctica,** *Antarctic research (Chinese edition),* Dec. 1991 3(4), p.54-59, In Chinese with English summary. 3 refs.

A successive three-months of bottom water temperature observation data, obtained in the Great Wall Bay in the summer of 1987, are statistically analyzed and illustrated. The results are summarized, and tables and graphs are presented showing the sunrise and sunset time at the Great Wall Station; the characteristic values of the Great Wall Bay bottom water temperature; its daily mean temperature changes; and the average diurnal changes, and the power spectra, of the bottom water and air temperature.

J-46457
Morrow, R., **Eddy momentum flux and its contribution to the southern ocean momentum balance,** *Nature,* June 11, 1992 357(6378), p.482-484, 24 refs.

A large amount of momentum is transferred to the southern ocean by strong westerly winds. Analytical and numerical models have suggested that transient eddies may be important in transporting this momentum away from the region of wind forcing, either horizontally or vertically downwards where it is balanced by bottom topographic drag. There are, however, few long-term *in situ* observations of horizontal eddy momentum flux, and no large-scale measurements of vertical eddy fluxes, to test these models. As a result, the momentum balance of the Antarctic Circumpolar Current (ACC) remains uncertain, and the role of eddies controversial. Geosat satellite altimeter data are used to resolve directional eddy kinetic energy and horizontal eddy momentum flux in the ACC on fine spatial and temporal scales. The complex spatial distribution of surface eddy momentum flux is strongly influenced by bottom topography. The horizontal eddy momentum flux tends generally to concentrate the mean flow, although some regions of divergence are observed. These results show that the zonally averaged horizontal eddy momentum flux from transient eddies is an order of magnitude too small, and in the wrong direction to directly balance the eastward momentum input from wind. (Auth. mod.)

J-46464

Ikeda, S., Kojima, T., **Oceanographic data of the 31st Japanese Antarctic Research Expedition from Nov. 1989 to Mar. 1990,** *Japanese Antarctic Research Expedition. JARE data reports,* Mar. 1992 No.174, 52p.

The report presents data of oceanographic observations on board the icebreaker *Shirase* and tidal observations at Showa Station. Oceanographic observations include surface temperature measurements and surface water chemical analysis, surface current measurements, expandable bathythermograph data collected at 121 stations, and conductivity, temperature and depth profiling data collected at 8 stations. Serial observations were made at 15 stations; all the results, together with meteorological data, are presented in tables.

J-46499

Maamaatuaiahutapu, K., **Brazil-Malvinas Confluence: water mass composition,** *Journal of geophysical research,* June 15, 1992 97(C6), p.9493-9505, 23 refs.

A quantitative analysis of water masses in the Brazil-Malvinas Confluence zone is performed with a least squares multiple tracer analysis using data from the confluence winter 1989 cruise. The purpose is to find the mixture of source water types that best describes the composition of a given water sample. This method is valuable in regions involving strong mixing among various source water types, as in the Brazil-Malvinas Confluence zone. Seven main core layers are identified in this region, and all are retained for the analysis: the Thermocline Water (TW), the Subantarctic Surface Water, the Antarctic Intermediate Water (AAIW), the Upper Circumpolar Deep Water, the North Atlantic Deep Water (NADW), the Lower Circumpolar Deep Water, and the Weddell Sea Deep Water. Tracers selected are temperature, salinity, dissolved nutrients, and oxygen. The results show the proportion of each source water type along four east-west sections (35.4S, 36.5S, 37.9S, 39S). They are accurate to within 20% for all sources. The solution presents evidence of local recirculation of AAIW, largely influenced by the two strong currents, Brazil and Malvinas. Southward TW and NADW separate from the coast, with NADW turning eastward at a higher latitude than TW. (Auth.)

J-46583

Domanov, M.M., Lipski, M., **Annual cycle of chlorophyll *a* and primary production of phytoplankton in Admiralty Bay (Antarctica),** *Polskie archiwum hydrobiologii,* 1990 37(4), p.471-478, 19 refs.

During the year 1988 seasonal changes of chlorophyll *a* and primary production were recorded in surface waters in Admiralty Bay. Chlorophyll *a* concentrations changed from 3.8 mg/cu m to values below 0.1 mg/cu m during the winter period. The peak of primary production was observed also in Feb. (82 mgC/cu m/d). During the whole year the primary production of phytoplankton was estimated to be 6.6 gC/cu m. The assimilation number tends to decrease from 1.9 during the phytoplankton bloom to zero in winter. (Auth.)

J-46646

Stein, M., **Variability of local upwelling off the Antarctic Peninsula, 1986-1990,** *Archiv für Fischereiwissenschaft,* June 1992 41(2), p.131-158, With German summary. 11 refs.

Based on a data set of CTD profiles obtained during three cruises to the area of the Antarctic Peninsula and the Bransfield Strait with its western and eastern approaches in 1986, 1987, and 1989/90, the paper discusses upper ocean geostrophic shear patterns. The data suggest, throughout the years, the existence of cyclonic gyres which might indicate places of local upwelling west of the Antarctic Peninsula. (Auth.)

J-46691

Medina, F., **Ocean currents in Discovery Bay** [Estudio de corrientes marinas en la Bahía Chile (Bahía Discovery)], *Acta antártica ecuatoriana,* 1990 Vol.1, p.1-11, In Spanish with English summary. 6 refs.

Surface water velocities have been measured in Chile Bay as part of the Second Ecuadorian Antarctic Scientific Expedition, during the southern summer, 1990. Drifting ice floes broken from shore were used as a Lagrangian tracer. Surface currents and wind observations are compared. Surface circulation is determined by winds, when the wind speed is higher than 6 m/s. Maximum values and direction of the surface drift current depend exclusively upon the prevailing wind field. Current speed may reach up to 40 cm/s. (Auth.)

J-46692

Cornejo, M.P., Arcos, F., **Physical and biological characteristics of the water column in Discovery Bay** [Estudio de algunas características físicas y biológicas de la columna de agua en Bahía Chile—Isla Greenwich], *Acta antártica ecuatoriana,* 1990 Vol.1, p.13-19, In Spanish with English summary. 5 refs.

Some physical and biological characteristics of the water column in Discovery Bay were analyzed through the spatial distribution of temperature, salinity and chlorophyll *a,* in Feb. 1990. Vertical distribution of isotherms, isohalines, isopycnes and isolines of chlorophyll *a* show that the dominant circulation is basically thermohaline and that it is influenced by the topography. There is a water mass entering the Bay by the northwestern side and moving towards the center (following the topography), then it upwells, with a returning flux going out superficially by the eastern side. (Auth.)

J-46693

Zambrano, E., Allauca, S., Arcos, F., **Thermal structure and surface distribution of chlorophyll *a* in Drake Passage, 1989-1990** [Estructura termal y distribución superficial de clorofila *a* en el Paso Drake durante el verano austral de 1989-1990], *Acta antártica ecuatoriana,* 1990 Vol.1, p.21-27, In Spanish with English summary. 12 refs.

Hourly monitoring of sea surface temperature, salinity, chlorophyll *a* concentrations and atmospheric temperature and wind, carried out during two cruises of the R/V *Orion* in the Drake Passage in the summer of 1990, is reported. Vertical temperature profiles clearly show the presence of Polar and Subantarctic fronts. In the one-month interval between the cruises, a marked decrease of surface and subsurface water temperature was noted. Variations in air temperature, winds, and chlorophyll *a* concentrations are discussed.

J-46698
Vega, M., Rueda, M., Valencia, M., **Cs-137 contamination of the antarctic ecosystems** [Análisis de la problemática de la contaminación por Cs-137 en los ecosistemas antárticos], *Acta antârtica ecuatoriana,* 1990 Vol.1, p.69-71, In Spanish with English summary. 4 refs.

The evaluation of the concentration of Cs-137 as a gamma radiant radionuclide in water, soils and plants, permits one to establish the motility of this isotope, considered to be one of the most important elements of contamination derived from the nuclear fission processes. Gamma spectroscopic analyses of water and plant samples collected in Drake Passage and on South Shetland Is. established that the Cs-137 levels were below detection limits. However, variable quantities of this isotope were determined in soil samples. (Auth. mod.)

J-46714
Arcos, F., Cordova, J.L., **Chlorophyll *a* distribution in Bransfield Strait, 1987-1988** [Distribución de clorofila *a* en el Estrecho Bransfield (Antártica) durante el verano austral de 1987-1988], *Acta antârtica ecuatoriana,* 1989 Vol.1(1), p.93-101, In Spanish with English summary. 7 refs.

Analysis of the horizontal and vertical distribution of chlorophyll *a* was carried out in samples from 23 stations and four levels in the Bransfield Strait during the austral summer of 1987-1988. High heterogeneity was found in the distribution, showing relationships among the values of chlorophyll, surface temperature, and dissolved oxygen. The high values were restricted to the north of the Strait. Analysis of the pigment in enclosed bays showed the highest value in Arthur Bay, Anvers I. at the southwest of Bransfield Strait. (Auth.)

J-46725
Woods, J., **Oceanography on a global scale: the new challenge,** *Physics education,* 1991 Vol.26, p.159-163,168.

The ocean plays a central role in medium and long term climate change. In order to meet the urgent need to update the existing data base, the World Ocean Circulation Experiment (WOCE) has been launched. Meanwhile, assimilation of data into mathematical models—such as the Fine Resolution Antarctic Model (FRAM)—enables oceanographers to take account of non-linearity in oceanic flow, and this new approach is already yielding greatly improved simulations.

J-46801
Pudsey, C.J., **Late Quaternary changes in Antarctic Bottom Water velocity inferred from sediment grain size in the northern Weddell Sea,** *Marine geology,* June 1992 107(1/2), p.9-33, Refs. p.31-33.

Newly formed bottom water (theta -0.7 C) in the northern Weddell Sea flows E or NE at speeds up to 10-15 cm/s, with velocity decreasing towards the center of the Weddell Gyre. Upper Quaternary sediments from this area contain a fine-grained terrigenous component plus biogenic silica with a small amount of ice-rafted debris. In cores from between 61 and 66S and from 3300 m to 4700 m water depth, the proportion of biogenic silica increases northwards, and the proportion of silt and well-sorted fine sand in surface sediments increases with average current velocity. Downcore, diatom-rich and diatom-poor sediments alternate on a scale of 1-3 m, and intervals with more diatoms contain a higher proportion of silt to clay. Preliminary stratigraphy suggests that the cyclicity in composition and texture is related to glacial-interglacial cyclicity. During warm periods, biogenic silica production takes place during several months of each year, and silt and fine sand are transported by bottom currents. During glacial periods with greater sea-ice cover than at present, biogenic productivity was suppressed and no silica was preserved in the sediments; in addition, a lower proportion of terrigenous silt implies that bottom currents were weaker. At sites with a present-day average velocity of 10 cm/s, a Last Glacial Maximum average velocity of 1 cm/s or less is inferred from grain-size measurements. (Auth. mod.)

J-46804
Nelson, D.M., Tréguer, P., **Role of silicon as a limiting nutrient to antarctic diatoms: evidence from kinetic studies in the Ross Sea ice-edge zone,** *Marine ecology progress series,* Mar. 1992 80(2-3), p.255-264, 48 refs.

During the austral summer of 1990 an intense diatom-dominated, ice-edge phytoplankton bloom in the southwestern Ross Sea resulted in depletion of silicic acid, nitrate and phosphate to concentrations much lower than is typical for antarctic surface waters. Silicic acid was depleted to <6 microM within the core of the meltwater field, where biogenic particulate silica concentrations exceeded 20 micromol/l. Three Si uptake kinetic experiments were conducted on natural phytoplankton assemblages from the nutrient-depleted zone; Si30-labeled Si(OH)4 was used to measure the uptake rate at concentrations ranging from 1 to 20 microM above ambient. Dependence of the specific uptake rate on silicic acid concentration conformed well to a Michaelis-Menten saturation model; maximum uptake rates ranged from 0.0022 to 0.0028/h which corresponds to maximum growth rates of 0.08 to 0.10 doublings/d. Half-saturation constants ranged from 1.1 to 4.6 microM, a range similar to values found in other areas of the ocean and considerably lower than those previously reported for several antarctic diatom species in culture studies. Results indicate detectable but weak substrate limitation of silicic acid uptake rate by the naturally occurring diatom assemblage in the western Ross Sea. Significant Si limitation in other subsystems of the southern ocean would be possible only if their resident diatom assemblages had much lower affinity for silicic acid than the authors observed. (Auth.)

J-46809
England, M.H., **On the formation of Antarctic Intermediate and Bottom Water in ocean general circulation models,** *Journal of physical oceanography,* Aug. 1992 22(8), p.918-926, 28 refs.

A series of coarse-resolution models were integrated with a view to determining the most appropriate representation of the largest-scale water masses formed in the southern ocean. In particular, it was hoped that the models could realistically simulate Antarctic Bottom and Intermediate Water. The ocean model employed has a global domain with a realistic approximation of the continental outlines and bottom bathymetry. The subgrid-scale variation of bottom bathymetry is removed by spatial averaging over each grid box. The annual mean forcing at the sea surface is derived from climatological fields of temperature, salinity, and wind stress. It is found that the salinity of shelf water in the Weddell and Ross Seas is critical if the model is to appropriately simulate the world's intermediate and bottom water masses. It is suggested that the sea-ice component of climate models is critical if the simulation is to capture the high-salinity shelf water and bottom-water formation adjacent to Antarctica and, in turn, allow for a realistic tongue of low-salinity Antarctic Intermediate Water (AAIW). The bathymetry of the Drake Passage is shown to determine the shape and strength of an intense meridional overturning cell in the southern ocean. By properly representing the northward extent of the Drake Passage, the formation and equatorward spreading of AAIW is simulated realistically. The scheme of AAIW formation obtained is quite different from the classical notion of circumpolar subduction of surface water at the polar front. (Auth. mod.)

J-46853
Cheng, X.H., Zhang, H.S., Xia, W.P., **Anomaly of fluorine in a sedimentary system, western antarctic ocean,** *Antarctic research,* Dec. 1991 2(2), p.59-67, 13 refs.

Fluorine content in bulk sediment and its pore water in the western antarctic ocean is 200-395 micrograms/g and 1.8-1.92 micrograms/ml respectively, far below the average reported previously in the world oceans (540 micrograms/g and 2.7 micrograms/ml, respectively). This study also shows that the distribution of fluorine in the sediments of the area is mainly controlled by the chemical composition of the material from the surrounding islands, and the element seems to be mostly incorporated in hornblende. The correlation between the fluorine and the hornblende amount in the sediments can be expressed statistically as follows: $F=217+\ln Vh$. The low concentration of fluorine in the pore water is largely due to the weak weathering process on the islands and the precipitation of the element with calcium. (Auth. mod.)

J-46854
Li, F.R., **Preliminary study of the oxygen-minimum layer in water area adjacent to South Shetland Islands and north of Ardley Island, Antarctica, in summer,** *Antarctic research,* Dec. 1991 2(2), p.68-74, 5 refs.

The vertical distribution of oxygen in the oxygen-minimum layer in waters adjacent to the South Shetland Is. and north of Ardley I. in summer has the following features: the depth at which the oxygen content greatly decreases coincides with the depth of the pycnocline; there is a thick water layer with low oxygen content; and the oxygen-minimum layer occurs below the thermocline and coincides with the depth at which the temperature increases the most. According to preliminary results of correlation analysis, the variation of the oxygen-minimum layer is related to the physical properties of the circulation and the biochemical process in the deep layer of the ocean. (Auth. mod.)

J-46866
Noh, I., **Algal pigments and their degradation products in southern ocean and Gulf of Mexico surface waters,** College Station, Texas A and M University, 1991, 143p., University Microfilms order No. 92-16986, Ph.D. thesis. Refs. p.125.137.

Photosynthetic pigments and their degradation products in suspended and sinking particles collected from the southern ocean and NW Gulf of Mexico surface waters were measured using High Performance Liquid Chromatography (HPLC). The short- term variations in flux rates of chlorophylls and carotenoid pigments, as well as their degradation products, were compared at several locations in Prydz Bay during summer 1987-88. Chlorophyll *a* accounted for approximately half of the pigments measured. A series of 5 phaeophorbide *a* derivatives, which are probably produced by zooplankton grazing, were the dominant degradation products in porphyrins. Among the carotenoid pigments, fucoxanthin dominated in both water column and sediment trap samples. Pigment data confirm the observations of Kang (1989) that diatoms were the dominant component of the Prydz Bay phytoplankton community. The flux rate of chlorophyll *a* at Outer Prydz Bay sites was generally highest at 50 m, and approximately double the flux rates at deeper horizons; however, at Inner Bay sites, the mean flux rate of chlorophyll *a* at 200 m was 4 times higher than that at 50 m. Such anomalously high fluxes at 200 m imply that grazers were locally abundant between 100 m and 200 m at these sites closest to land, and this hypothesis is supported by visual evidence of lots of fecal pellets in the 200 m trap. Turnover rates for algal pigments in Prydz Bay, computed as standing stocks divided by measured flux, were negligible. Thus, suspended particulate material in Prydz Bay was not recycled rapidly. (Auth. mod.)

J-46872
Johnson, T.J., Stewart, R.H., Shum, C.K., Tapley, B.D., **Distribution of Reynolds number stress carried by mesoscale variability in the Antarctic Circumpolar Current,** *Geophysical research letters,* June 19, 1992 19(12), p.1201-1204, 21 refs.

Satellite altimeter data collected by the U.S. Navy's Geosat Exact Repeat Mission were used to investigate turbulent stress resulting from the variability of surface geostrophic currents in the Antarctic Circumpolar Current. The altimeter measured sea level along the subsatellite track. The variability of the along-track slope of sea level is directly proportional to the variability of surface geostrophic currents in the cross-track direction. The two components of the slope were used at points where the satellite ground tracks cross to calculate orthogonal components of the current's variability. Two and a half years of data were used to compute the statistical structure of the variability, leading to a better understanding of the role of variability in the dynamics of the current. The statistics included the probability distribution functions for each component of the current, the time-lagged autocorrelation functions of the variability, and the Reynolds stress produced by the variability. The results demonstrate that stress is correlated with bathymetry. In some areas the distribution of negative stress indicates that eddies contribute to an acceleration of the mean flow, strengthening the hypothesis that baroclinic instability makes important contributions to strong oceanic currents. (Auth.)

J-46886
Dixon, J.E., **Circulation processes in Lapeyrère Bay, Anvers Island, Antarctica, and implications in the event of petroleum pollution,** Clinton, Hamilton College, 1991, 54p., 14 refs.

The focus of this paper is on the surface circulation processes in Lapeyrère Bay, a fjord on Anvers I. Data were collected during the summer melt season in Dec. 1987 and Jan. 1988. Meltwater from the surrounding glaciers, when present, was not found to play a large role in circulation. In contrast, iceberg melt affected surface temperatures and salinity by as much as 1 C and 1.2 ppt. in the upper 15 m of the water column. Using criteria developed by Shen, Yapa and Petroski and others, the author found that an oil spill in a sub-polar fjord such as Lapeyrère Bay could have potentially devastating effects, since the rate of spreading and chemical and biological degradation are strongly influenced by the season, weather, and amount of ice in the fjord. (Auth. mod.)

J-46903
Kawamiya, M., Nagata, Y., Michida, Y., Odamaki, M., **Seasonal sea-level variation at Syowa Station,** International Symposium on Okhotsk Sea and Sea Ice, 7th, Mombetsu, Hokkaido, Japan, Feb. 2-5, 1992. Abstracts, Mombetsu, Okhotsk Sea and Cold Ocean Research Association, 1992, p.165-169, 5 refs.

Sea level was measured at Showa Station from 1979 through 1988. The range of the seasonal variation averages about 26 cm, with the highest level in early winter and the lowest level in mid summer. Contributing factors to the higher sea level in winter may include decreases in salinity and density in the surface layers as the heavier saltier water sinks to the bottom, and increases in the coastal current and wind velocities, with katabatic winds being the major factor.

J-46913
Dafner, E.V., **Dissolved organic carbon in waters of the Polar Frontal Zone of the Atlantic Antarctic in the spring-summer season of 1988-1989,** *Marine chemistry,* Apr. 1992 37(3-4), p.275-283, 13 refs.

Samples were collected and preserved for onshore measurement of dissolved organic carbon (DOC) in the area extending over the Polar Frontal Zone (PFZ) in Sep.-Dec. 1988. The highest concentrations of DOC were found in the pycnocline layer near the southern boundary of the PFZ and in dynamically active areas, such as meanders and mesoscale eddies, where the DOC concentrations amounted to 6-8 mg/l. To the north and south of the PFZ, concentration of DOC diminished considerably, as a result of less intensive processes of organic matter production. (Auth.)

J-46915

Trumbore, S.E., Jacobs, S.S., Smethie, W.M., Jr., **Chlorofluorocarbon evidence for rapid ventilation of the Ross Sea,** *Deep-sea research,* 1991 38(7), p.845-870, Refs. p.868-870.

In 1984, concentrations of CFC-12 and CFC-11 in Ross Sea continental shelf water averaged nearly half that of saturated surface water. Circumpolar Deep Water within 50 km of the Ross Sea continental shelf also contained measurable CFC-12 and CFC-11, but an order of magnitude less than shelf waters. CFC-12 and CFC-11 concentrations in the deep water overlying the continental slope increased with depth, indicating recent ventilation and bottom water formation near the continental shelf. Several water masses on the continental shelf that are commonly distinguished on the basis of temperature and salinity characteristics also varied in CFC content, and thus in their modes and rates of ventilation and renewal. A time-dependent model reproducing the 1984 sub-surface shelf water CFC concentrations demonstrates the relative importance of mixed layer entrainment, gas exchange through leads in the winter sea ice field, and mixing with source waters derived from the Circumpolar Deep Water. Model results show that mixed layer entrainment at the beginning of winter is the dominant process for ventilating sub-surface shelf water in the eastern Ross Sea, while western shelf waters also require significant gas exchange during winter. (Auth. mod.)

J-46938

Cheng, X.H., Xia, W.P., Zhang, H.S., Lu, Y.L., **Early diagenesis and biogeochemistry of iodine in west antarctic ocean,** *Oceanologia et limnologia sinica,* Mar. 1992 23(2), p.115-123, In Chinese with English summary. 14 refs.

During the First Chinese Antarctic Ocean Exploration from Dec. 1984 to Feb. 1985, 27 grab samples and 2 box samples were obtained. With tracing to the diagenetic distribution of iodine, some records relative to the reversible processes of early diagenesis and biogeochemistry of iodine are obtained. The distribution of iodine depends on biogenic materials, and thus the regeneration of bioiodine mainly occurs in early diagenesis. Furthermore, its regeneration process is closely correlated with the release of sedimentary organic nitrogen. The estimated rate of iodine regeneration is 0.023 micrograms/g/yr on average. The diffusion fluxes of iodine returned to the aquatic biogeochemical system ranged from F=0.58 picogram/sq cm/sec to F=0.083 picogram/sq cm/sec. It shows potential significant effects of pH, carbonate balance and redox conditions on the regeneration release of bioiodine; both basic and reductive conditions will facilitate the release of iodine from sediments in an early diagenetic environment. (Auth. mod.)

J-47007

Stocchino, C., Lusetti, C., **Tide characteristics in Terra Nova Bay** [Nuove osservazioni sulle caratteristiche della marea a Baia Terra Nova (Mare di Ross—Antartide)], Genoa, Istituto Idrografico della Marina, 1991, 21p., In Italian with English summary. 3 refs.

This paper presents the results of an analysis of two tide recordings carried out at Terra Nova Bay during the 4th and 5th Italian antarctic expeditions in 1988-89 and 1989-90, respectively. Using the Doodson method, two new series of tidal harmonic constants were computed, also defining their mean values with due consideration of earlier calculations (Stocchino and Lusetti, 1988). The most significant items of concordance are hereby evidenced. In particular, the diurnal character of such tide was confirmed, and characteristic data on the local variations of the sea-level were evaluated. (Auth.)

J-47009

Stocchino, C., Lusetti, C., **Hydrology and dynamics of Terra Nova Bay** [Prime osservazioni sulle caratteristiche idrologiche e dinamiche di Baia Terra Nova (Mare di Ross—Antartide)], Genoa, Istituto Idrografico della Marina, 1990, 55p., In Italian with English summary. 20 refs.

The hydrologic situation of a zone in Terra Nova Bay has been examined, in particular the behavior of isotherms and isohalines, at 0, 50, 100 and 300 m depths. TS diagrams and stability profiles were obtained. A study of the dynamic topographies relative to the 300 m depth is also discussed. The results show a stable situation and the TS curves show an almost rectilinear behavior. The dynamic topographies show a current behavior that seems to indicate a significant difference between the surface and the deeper layers. (Auth. mod.)

J-47010

Stocchino, C., Lusetti, C., **Harmonic tide constants of Terra Nova Bay** [Le costanti armoniche di marea di Baia Terra Nova (Mare di Ross—Antartide)], Genoa, Istituto Idrografico della Marina, 1988, 23p., In Italian with English summary. 10 refs.

The harmonic tide constants of Terra Nova Bay, calculated from two records of 49 and 36 days, are presented. The analysis is performed by using Doodson's method after the elimination from the first record of two gaps of data by the maximum entropy method. After some consideration about the reliability of the data, a set of harmonic constants is obtained. A good agreement between observed and calculated data is found. The behavior of the tide is diurnal, in agreement with the results of other authors.

J-47011

Stocchino, C., Manzella, G.M.R., **Analysis of currents in Terra Nova Bay** [Analisi delle correnti marine di Baia Terra Nova (Mare di Ross—Antartide)], Genoa, Consiglio Nazionale delle Ricerche, 1991, 56p., In Italian with English summary. 8 refs.

Hydrological and current measurements were carried out in Terra Nova Bay; the data permitted the definition and distribution of water masses. The coastal area was characterized by the presence of warmer and more saline water, attributed to the effects of katabatic winds producing an eastward advection of the newly formed ice, the presence of the Drygalski Ice Tongue preventing the northward drift of the ice. The circulation was characterized by large scale vortices whose signals were detected by both CTD and current meters. At the surface, the circulation was driven by local forcing; advective movements were detected at depth. The spatial and temporal variability was very high. Periodicity is related to diurnal tides of 5-day-fluctuation periods attributed to atmospheric forcings. (Auth.)

J-47038

Naganobu, M., **Vertical distributions of temperature, salinity and geostrophic flow along 120W in the southern ocean. (Extended abstract),** NIPR Symposium on Polar Biology, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1992, p.163-165, 1 ref.

Vertical distributions of temperature, salinity and geostrophic flow, from 55S to 70S near the pack-ice line along 120W in the Pacific Ocean, are analyzed using the Eltanin data collected between Dec. 28, 1963 and Jan. 17, 1964.

J-47039

Matsuda, O., Kawaguchi, K., Ishikawa, S., Nagahama, M., **Seasonal variation in particulate organic matter under the antarctic fast ice with special reference to C:N:P ratio and phytoplankton activity. (Extended abstract),** NIPR Symposium on Polar Biology, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1992, p.168-170, 5 refs.

From the viewpoint that the seasonal variation of organic matter plays an important role in the energy flow and food availability in the ecosystem under ice, a year-round observation on particulate organic matter was carried out from Feb. 1984 to Jan. 1985 at 3 stations in the Kita-no-ura cove off East Ongul I., Lützow-Holm Bay, during the 25th Japanese Antarctic Research Expedition. Seasonal variations in particulate organic carbon, particulate organic nitrogen and particulate phosphorus were monitored with special reference to the C:N:P ratio and chlorophyll *a* standing stock. Marked seasonal variations of particulate matter, particularly chlorophyll *a,* were observed in the surface water. The concentration of particulate matter was generally high in summer, especially in the surface water, but low in winter.

J-47057

Lutjeharms, J.R.E., **Oceanography and fish distribution of the southern ocean,** Fishes of the southern ocean, edited by O. Gon and P.C. Heemstra, Grahamstown, South Africa, J.L.B. Smith Institute of Ichthyology, 1990, p.6-27.

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The southern ocean has some unique characteristics as a major component of the world ocean. Amongst these are the near-circular symmetry of most of its physical and chemical characteristics, the immense expanse of cold surface water, globally by far the largest, as well as the most pronounced seasonal variation at the sea surface of any comparable ocean basin. Clearly, the distribution of these physical and chemical variables in space and time should also be reflected in the distribution patterns of biological organisms, especially the fishes. It is the purpose of this chapter to describe in general terms what is known about the physical properties and processes in the southern ocean that may influence the creation of specific biogeographical boundaries and habitats. In order to identify those physical variables, complexes of variables, or dynamic processes that may be particularly implicated in southern ocean biogeography, it is necessary to establish briefly what is presently known about oceanic biogeography in general and about southern ocean ichthyogeography in particular. (Auth.)

J-47114

Capella, J.E., **Circulation and temperature effects on the development and distribution of the eggs and larvae of the antarctic krill *Euphausia superba:* A modeling study,** College Station, Texas A and M University, 1989, 162p, University Microfilms order No. 90-15466, Ph.D. thesis. Refs. p.153-161.

An existing three-dimensional time-dependent circulation model was adapted to investigate the circulation in the South Shetland Is.—Bransfield Strait region. The simulated circulation distributions show seasonal variability in the upper 150 m. A second time- and temperature-dependent model was developed to simulate the descent-ascent behavior of the eggs and larvae of *Euphausia superba.* The two models were combined in a Lagrangian particle tracing model to simulate the trajectories of the krill eggs and larvae. The Lagrangian trajectories show that most of the horizontal transport of the egg-larva particles occurs after the larva has reached the surface. Trajectories of eggs released north of the South Shetland Is. and east of Livingston I. are westward. Eggs released north of Snow I. are transported into Drake Passage. Krill larvae are transported into the Bransfield Strait from the Bellingshausen and Weddell Seas. The Lagrangian trajectories show that eggs released north of the South Shetland Is. complete their development faster than eggs released in Bransfield Strait or east of the Antarctic Peninsula; the surface flow is the primary factor influencing the egg-larva trajectories; and the timing of the krill spawning has a significant effect on the eventual position of the feeding larvae. (Auth. mod.)

J-47119

Stott, L.D., **Antarctic paleoceanography,** Kingston, University of Rhode Island, 1989, 393p., University Microfilms order No. 90-08850, Ph.D. thesis. Refs. p.370-393.

The Paleogene paleoceanography of the Weddell Sea was studied using calcareous biogenic sequences from Maud Rise. A new planktonic foraminiferal biostratigraphy has been developed for the Paleogene which has been calibrated to magnetostratigraphy. The Paleogene thermal structure of the seasonal thermocline was investigated for the Paleogene, using information derived from the isotopic composition of planktonic foraminifera. The results indicate that a well-developed thermocline existed in the Antarctic during the early Paleogene, but was progressively reduced in thickness and possibly seasonal duration during the late Paleogene. Benthic foraminiferal isotopic composition during the Paleogene from two sites located at different depths on Maud Rise provide evidence of a multilayered Paleogene ocean. This is possibly the first evidence for warm saline bottom waters for the Cenozoic. The Cretaceous/Tertiary boundary was analyzed using the isotopic composition of multiple species of benthic and planktonic foraminifera. Evidence of a significant climatic cooling is recorded in the isotopic compositions of planktonic and benthic foraminifera from the last 200 Kyrs of the Cretaceous, suggesting the marine environment was undergoing considerable change prior to the mass extinction at the K/T boundary. (Auth. mod.)

J-47140

Minas, H.J., Minas, M., **Net community production in "High nutrient-low chlorophyll" waters of the tropical and antarctic oceans: grazing *vs* iron hypothesis,** *Oceanologica acta,* 1992 15(2), p.145-162, With French summary. 84 refs.

A study comparing HNLC waters in tropical and antarctic regions is described, and antarctic nutrient consumption diagrams are presented. An overall consumption evaluation along a 1,550 km north-south section leads to atomic assimilation ratios of *delta*Si/*delta* N/*delta*P=55.9/12.3/1. From the end of winter to end of summer, the average nitrate consumption is 0.38 mol/sq m. For this five month period, the calculated NP is 0.2 g C/sq m/d. From the silicon-nitrogen ratios during nutrient consumption and those in the particulate material, the authors deduce an *f*-ratio slightly lower than 0.5. This *f* value confirms earlier data derived from N-15 uptake studies. The model application leads to a Vmax (TP) value of 0.54/d, which does not seem excessively low in the low temperature regime of the southern ocean. An antarctic scenario is discussed starting with "grazing" limitation and finishing with iron limitation. Despite evidence in favor of the grazing hypothesis which allows one to classify regions geographically into "high and low" speed areas of phytoplankton development, a global chart of dust inputs into the ocean strongly supports the iron limitation hypothesis. This observation constitutes a challenge to the "grazing only" hypothesis, and militates in favor of more detailed future studies. (Auth. mod.)

J-47144

Capella, J.E., Ross, R.M., Quetin, L.B., Hofmann, E.E., **Note on the thermal structure of the upper ocean in the Bransfield Strait-South Shetland Islands region,** *Deep-sea research,* Jul./Aug. 1992 39(7/8), p.1221-1229, 12 refs.

Sixteen XBT sections were occupied from Dec. 1982 to July 1987 in and around the Bransfield Strait and the South Shetland Is. These and other temperature data from the FDRAKE75, FDRAKE76 and DRAKE79 field programs provide a description of the temperature structure and water mass distribution of the upper 500 m in this region. Temperature distributions at 300 and 500 m show Circumpolar Deep Water (>0 C) north of the South Shetland Is., which enters Bransfield Strait through a gap between Smith and Snow Is. Inside the Strait this water is confined to a narrow band along the southern flank of the Islands. The fine spatial resolution of the XBT sections shows a sharp thermal gradient between the cold (<0 C) Bransfield Strait waters and the warmer (>0 C) waters of Drake Passage origin. The presence of cold Bransfield Strait waters over the northeast portion of the Island slope region is related to north-south motions of this temperature boundary. The Polar Slope Current, on the northern side of the South Shetland Is., appears as a tongue of cold (<0 C) water that extends westward from Elephant I. to the gap between Smith and Snow Is. (Auth.)

J-47152

Martínez, C.M., Pérez Díaz, T., **Oceanographic activities during the 1986-1988 expeditions** [Programa de oceanografía antártica. Actividades desarrolladas durante las campañas CAV 86/87 y CAV 87/88], *Montevideo. Instituto Antártico Uruguayo. Actividad científica 1987/88,* Sep. 1989 Vol.3, p.13-17, In Spanish with English summary. 2 refs.

Oceanographic investigations carried out jointly by scientists from Uruguay and Argentina on board the *Almirante Irizar,* during Jan. and Feb. of 1987 and 1988 in Drake Passage and the Weddell-Scotia Confluence, are reported. Two principal features of the program are discussed: bathymetric and thermal observations, and the development and testing of the data collection and processing systems.

J-47153

Uruguay. Servicio de Oceanografía, Hidrografía y Meteorología de la Armada, **Hydrographic survey program** [Programa de Relevamientos Hidrográficos], *Montevideo. Instituto Antártico Uruguayo. Actividad científica 1987/88,* Sep. 1989 Vol.3, p.21-26, In Spanish with English summary.

A hydrographic survey, carried out in Fildes Bay during the 1987-1988 austral summer, by the Uruguayan Antarctic Institute and the Naval Oceanography, Hydrography and Meteorology Service, is reported. Also discussed is the installation of the first Uruguayan buoy in the Antarctic with the assistance of the Navy.

J-47154

Forbes, E.A., **Tide observations at Suffield Point** [Programa de Mareografía. Observaciones de mareografía en Punta Suffield (Isla Rey Jorge)], *Montevideo. Instituto Antártico Uruguayo. Actividad científica 1987/88,* Sep. 1989 Vol.3, p.27-36, In Spanish with English summary. 1 ref.

Tide observations were carried out at Suffield Point (King George I.), from Dec. 1987 to Feb. 1988, by means of a tide gauge, resulting in a 56-day series of hourly observations from which the non-harmonic constants were calculated. The mean sea-level was estimated with the use of an XO filter. (Auth.)

J-47217

Pichon, J.J., **Surface water temperature changes in the high latitudes of the Southern Hemisphere over the last glacial- interglacial cycle,** *Paleoceanography,* June 1992 7(3), p.289-318, Refs. p.316-318.

A set of numerical equations is developed to estimate past sea surface temperatures (SST) from fossil antarctic diatoms. These equations take into account both the biogeographic distribution and experimentally derived silica dissolution. The data represent a revision and expansion of a floral data base used previously, and include samples resulting from progressive opal dissolution experiments. Factor analysis of 166 samples (124 Holocene core top and 42 artificial samples) resolved four factors. Three of these factors depend on the water mass distribution (one subantarctic and two antarctic assemblages); factor 4 corresponds to a "dissolution assemblage". Inclusion of this factor in the data analysis minimizes the effect of opal dissolution on the assemblages and gives accurate estimates of SST over a wide range of biosiliceous dissolution. The reconstructed SST records present strong analogies with the air temperature record over Antarctica at the Vostok site, derived from changes in the isotopic ratio of the ice. This similarity may be used to compare the oceanic isotope stratigraphy and the Vostok time scale derived from an ice flow model. The oceanic time scale, if taken at face value, would indicate that large changes in ice accumulation rates occurred between warm and cold periods. (Auth. mod.)

J-47224

Sharma, G.S., Peter, B.N., **Entrainment of circumpolar water in the Indian Ocean region of the Antarctic,** *Indian Academy of Sciences. Proceedings. Earth and planetary sciences,* Mar. 1990 99(1), p.425-438, 21 refs.

DLC QE1.P733

The net influx of the circumpolar water on the western (approximately along 10E) and eastern (approximately 115E) boundaries of the Indian Ocean, adopting the method of Montgomery and Stroup, is computed on bivariate distribution of potential thermosteric anomaly and salinity to identify the characteristics of the flux. The zonal flux at both the boundaries indicates an alternate strong easterly and westerly flow between 36S and 45S, south of which the flow is mainly easterly but weak up to 56S. At the western boundary the easterly flow is 146 Sv and westerly is 98.07 Sv, while at the eastern boundary (115E) the corresponding fluxes are 123.46 Sv and 27.20 Sv, respectively, indicating a net outflux of 48.33 Sv. (Auth. mod.)

J-47270

Saint-Guily, B., Lamy, A., **Propagation of planetary waves trapped by a zonal escarpment** [Propagation des ondes planétaires guidées par un talus zonal], *Académie des sciences, Paris. Comptes rendus. Série II,* Aug. 30, 1990 311(5), p.541-546, In French with abridged English version. 5 refs.

Pressure gauge records made during 1986, 1987 and 1988 on the sea bed near Kerguelen Is. show important energy density peaks for periods between 1 week and 3 months, including monthly and fortnightly tidal periods. An analytical study of long planetary waves trapped by a zonal escarpment leads to explicit solutions. In the frequency-wave number diagram corresponding to the various modes, limit points are found with periods near the observed ones. (Auth.)

J-47272

Park, Y.H., **Satellite evidence of semiannual baroclinic Rossby waves in the Indian Ocean** [Mise en évidence d'ondes planétaires semi-annuelles baroclines au Sud de l'Océan Indien par altimétre satellitaire], *Académie des sciences, Paris. Comptes rendus. Série II,* Mar 29, 1990 310(7), p.919-926, In French with abridged English version. 3 refs.

Meso-scale planetary waves in the Crozet basin in the Indian Ocean have been detected and studied by two-dimensional spectral analysis of sea level variability deduced from GEOSAT satellite altimeter measurements. The maximum energy of these westward propagating waves is strongly concentrated in periods about 6 months and wavelengths of 300 to 600 km with phase speeds of 2 to 4 cm/s. These spectral characteristics are consistent with those of baroclinic Rossby waves modified by the bottom topography of the basin. (Auth.)

J-47306

Dehairs, F., Baeyens, W., Goeyens, L., **Accumulation of suspended barite at mesopelagic depths and export production in the southern ocean,** *Science,* Nov. 20, 1992 258(5086), p.1332-1335, 33 refs.

The relation between the accumulation of barite (BaSO4) microcrystals in suspended matter from the mesopelagic depth region (100 to 600 m) and the type of production in the euphotic layer (new versus recycled) was studied for different southern ocean environments. Considerable subsurface barite accumulated in waters characterized by maintained new production and limited grazing pressure during the growth season. On the other hand, little if any barite accumulated in areas where relatively large amounts of photosynthetically fixed carbon were transferred to the microheterotrophic community and where recycled production became predominant. (Auth.)

J-47307

Howard, W.R., Prell, W.L., **Late Quaternary surface circulation of the southern Indian Ocean and its relationship to orbital variations,** *Paleoceanography,* Feb.1992 7(1), p.79-117, Refs. p.113-117.

The paleoceanographic history of the southern Indian Ocean is reflected by the movement of two prominent dynamical features of the southern ocean: the Subtropical Convergence (STC) and the Antarctic Polar Front (APF). These fronts, and their associated sea surface temperature (SST) signatures, are well delineated by planktonic foraminiferal faunas in surface sediments of the southern Indian Ocean. Using a transect of piston cores between 42S and 48S at about 90E, the latitudinal distribution of planktonic foraminiferal faunas over the past 500,000 years has been reconstructed. Time series analyses of the SST records in this transect reveal statistically significant concentrations of variance in the primary orbital frequency bands. SST variations in these bands are coherent with orbital variations and with changes in *delta*O-18. SST in the subantarctic Indian Ocean slightly precedes changes in *delta*O-18 occurring in the eccentricity, obliquity, and precession bands, and lag orbital variations in the obliquity and precession bands. These results place important constraints on possible mechanisms of interhemispheric climatic timing. The similarities in temporal patterns and timing among southern ocean SST, atmospheric CO2, and relative flux of North Atlantic Deep Water implicate atmospheric carbon dioxide and deep water circulation as possible interhemispheric pacing mechanisms. (Auth. mod.)

J-47313

Broecker, W.S., **Geochemical constraints on ocean general circulation models,** *Lawrence Livermore National Laboratory. Final report,* Feb. 1992 UCRL-CR-109689, 14p. DE92 010805.

The discussed aspects of geochemical constraints on ocean general circulation models concentrate on the following research topics: the study of dynamic constraints on the extent of CO2 uptake by an iron fertilized antarctic ocean; the mixing dynamics of the antarctic ocean; interhemispheric transport of CO2 through the ocean; and the role of marine biology in fossil fuel CO2 uptake by sea. (Auth. mod.)

J-47314

Chipman, D.W., Takahashi, T., Breger, D., Sutherland, S.C., **Investigation of carbon dioxide in the South Atlantic and northern Weddell Sea areas (WOCE Sections A-12 and A-21) during the METEOR expedition 11/5, January-March 1990,** *U.S. Department of Energy. Final technical report,* Dec. 1991 DOE/ER/60943—1, 111p., DE92 010027, 25 refs.

This report summarizes the results of investigations during the oceanographic expedition aboard the F/S *Meteor* in the South Atlantic Ocean including the Drake Passage, the northern Weddell Sea and the eastern South Atlantic during the summer of 1990. The total CO2 concentration in about 1300 seawater samples and CO2 partial pressure (pCO2) in about 870 seawater samples collected at 77 stations were determined aboard the ship using a coulometer and equilibrator/gas chromatograph system. The temperature, salinity, dissolved oxygen and nutrient salt data presented in this report were determined by other participants of the expedition including the members of the Oceanographic Data Facility of the Scripps Institution of Oceanography, Argentine Hydrographic Office and German institutions. (Auth. mod.)

J-47335

Frew, R.D., Hunter, K.A, **Influence of southern ocean waters on the cadmium-phosphate properties of the global ocean,** *Nature,* Nov. 12, 1992 360(6400), p.144-146, 14 refs.

Measurements of the cadmium content of marine CaCo3 deposits, such as aragonitic corals and foraminiferal shells, have been used to trace past ocean circulation and as an indicator of labile nutrient concentrations. In particular, studies of foraminiferal cadmium have provided insight into the oceanic processes controlling atmospheric CO2 concentration in glacial times. The use of Cd/Ca ratios as a labile nutrient indicator is made possible by a relationship between seawater cadmium and phosphate content that is remarkably uniform throughout the present ocean. Recent data of cadmium and phosphate in southern ocean waters are presented. They suggest that a break in this uniformity is created by the input of Cd-depleted subantarctic waters into the intermediate waters of the global ocean.

J-47359

McTaggert, A.R., Burton, H., **Dimethyl sulfide concentrations in the surface waters of the Australasian antarctic and subantarctic oceans during an austral summer,** *Journal of geophysical research,* Sep. 15, 1992 97(C9), p.14,407-14,412, 39 refs.

Dimethyl sulfide (DMS) was measured in surface seawater samples collected between Tasmania and Antarctica in the Australasian sector of the southern ocean during the 1988-1989 austral summer. The mean DMS concentration in subantarctic waters for January was 20.5 nmol/L decreasing to 4.0 nmol/L in the Antarctic Convergence. During December and January the Australasian Antarctic Divergence appears to be an area of high primary productivity as the concentration of DMS in these surface waters remained relatively constant at 18.5 nmol/L. Samples collected on the shelf and in coastal waters of Prydz Bay, East Antarctica, show a distinct rise in DMS concentration on all voyages with a maximum concentration of 122 nmol/L recorded in January near Davis. (Auth.)

J-47372

Brehme, I., **Sediment facies and bottom water current on the continental slope in the northwestern Weddell Sea** [Sedimentfazies und Bodenwasserstrom am Kontinentalhang des nordwestlichen Weddellmeeres], *Berichte zur Polarforschung,* 1992 No.110, 127p., In German with English summary. Refs. p.74-83.

Geologic cores on two profiles oriented normal to the continental shelf and slope have been investigated to reconstruct the Quaternary sedimentary history of the southeast continental border of the South Orkneys (NW Weddell Sea). The sediments are described macroscopically and their fabric investigated by use of X-radiographs. Laboratory work comprised detailed grain-size analysis, determination of the water content, carbonate, organic carbon and sand fraction composition. Stable oxygen and carbon isotopes were measured on planktonic foraminifera. Palaeomagnetism, analysis of Th-230 content, and detailed comparison of the lithologic parameters with the oxygen isotope stages (Martinson curve) were used for stratigraphic classification of the sediments. (Auth. mod.)

See also:
A-46842 B-45221 B-45256 B-45262 B-45315 B-45340 B-45359
B-45431 B-45570 B-45583 B-45602 B-45723 B-45817 B-45848
B-45861 B-45900 B-45929 B-45931 B-45943 B-45944 B-45945
B-46009 B-46013 B-46014 B-46016 B-46018 B-46021 B-46023
B-46024 B-46025 B-46026 B-46032 B-46080 B-46081 B-46128
B-46226 B-46227 B-46228 B-46229 B-46232 B-46233 B-46240
B-46241 B-46242 B-46260 B-46262 B-46264 B-46265 B-46274
B-46291 B-46293 B-46295 B-46300 B-46354 B-46360 B-46379
B-46411 B-46413 B-46519 B-46537 B-46580 B-46705 B-46710
B-46750 B-46802 B-46805 B-46814 B-46815 B-46819 B-46832
B-46833 B-46841 B-46857 B-46887 B-46891 B-46979 B-47029
B-47043 B-47053 B-47055 B-47116 B-47216 B-47298 B-47322
D-46763 E-45092 E-45114 E-45117 E-45266 E-45313 E-45795
E-45910 E-45923 E-45926 E-45998 E-45999 E-46201 E-46340
E-46442 E-46611 E-46612 E-46641 E-46669 E-46670 E-46687
E-46888 E-47044 E-47045 E-47353 F-45185 F-45307 F-45351
F-45358 F-45463 F-45470 F-45503 F-45505 F-45521 F-45524
F-45534 F-45535 F-45536 F-45538 F-45543 F-45569 F-45636
F-45760 F-45995 F-46035 F-46036 F-46037 F-46376 F-46427
F-46434 F-46569 F-46648 F-46653 F-46658 F-46665 F-46843
F-47131 F-47132 F-47363 G-45399 G-45968 G-46073 G-46307
I-45073 I-45258 I-45481 I-45562 I-45564 I-45669 I-45717
I-45899 I-45980 I-45993 I-46066 I-46093 I-46207 I-46294
I-46455 I-46627 I-46636 I-46924 I-46926 I-46927 I-46928
I-47018 L-45865 L-45883 L-46086 L-46943

K. ATMOSPHERIC PHYSICS

K-45065

Sen, A.K., Mitra, A., Karmakar, P.K., Datta, A.K., **Estimate of millimeter wave propagation in polar region,** International Geoscience and Remote Sensing Symposium (IGARSS '90), College Park, MD, May 20-24, 1990. Digest, Vol.2. Remote sensing science for the nineties, New York, Institute of Electrical and Electronics Engineers, Inc., 1990, p.1547-1550, 5 refs.

To realize the broad band capability of millimeter waves in the vertical and horizontal path in the polar regions, a comprehensive study was undertaken in Antarctica concentrating on the propagation parameters at approximately 44/30 GHz and 94 GHz respectively. For the vertical path the positional dependence of the orbiting satellite and the geostationary satellite were considered. Accounting for the propagation parameters, the corresponding Tx and Rx configurations have been suggested for the LOS link and satellite link. (Auth. mod.)

K-45071

Barrow, C.H., Watermann, J., Evans, D.S., Wilhelm, K., **Observations of antarctic auroral electron precipitation with high stability in time and longitude,** *Annales geophysicae,* Apr. 1991 9(4), p.259-266, 12 refs.

Electron flux measurements were made in the energy range 0.1 to 12.5 keV by the electron spectrometer 1ES019 on board Spacelab 1, during the period Nov. 29 to Dec. 7, 1983. The spacecraft was in a 57 deg inclination circular orbit at an altitude of about 250 km with an orbital period of 90 min. Although the experiment was originally designed for artificial electron beam response observations, several periods of natural energetic electron precipitation were also recorded, and these have been surveyed and catalogued. On Nov. 30, 1983 Spacelab 1 observed electron precipitation during four successive Southern Hemisphere passes, one of which is of particular interest as the NOAA-7 satellite, which measured electron flux in the energy range 0.3 to 20 keV at an altitude of about 850 km, was then quite close in space and time. As correlative riometer and magnetometer observations suggest that auroral conditions remained stable during the 25-min period between the two sets of observations, the observations are used to infer the gross spatial structure of the auroral precipitation over the midnight sector. Comparison of the electron energy spectra observed by Spacelab 1 and NOAA-7 at different magnetic local times and at different altitudes suggests a high degree of longitudinal homogeneity in the precipitation. (Auth. mod.)

K-45082

Cazeneuve, H., Grinspon, M., **Linear transformations in the polar upper atmosphere** [Transformaciones lineales en la alta atmosfera polar], *Buenos Aires. Instituto Antártico Argentino. Contribución,* 1991 No.389, 18p., In Spanish with English summary. 9 refs.

The functions of spectral coherency and power transfer between time series have been estimated by using data from 7 antarctic stations. A linear association between the time series of some pairs of stations is found to persist during several active periods. The natural interpretation is that a linear transformation acts upon the primary source of perturbation, thus the signals received at one station are a filtered version of the signals received at the other one that forms the pair. The power spectra contain incoherent portions that can be attributed to the superposition of contributions from different sources, which introduces non-linearities in the spectral results. The persistent spectral response and the linear association between pairs of stations seems to reveal some characteristic property of the polar upper atmosphere. (Auth.)

K-45083

Cazeneuve, H., Grinspon, M., **Collective response from various antarctic stations** [Respuesta colectiva en varias estaciones antárticas], *Buenos Aires. Instituto Antártico Argentino. Contribución,* 1991 No.379, 22p., In Spanish with English, French and German summaries. 14 refs.

To find evidence of an ordered structure in geomagnetic variations, data from 6 antarctic stations were analyzed. Results from interspectral and cross-correlation analysis provide conclusive evidence of a collective response from the stations when magnetic activity is excited. Conditions of linearity of the coherency analysis indicate that over an extended area of Antarctica a similar energy distribution is effective during disturbed conditions. This area should be homogeneously disturbed, producing a highly correlated and spatially coherent pattern of activity at the stations involved. The interspectral analysis provides a further characterization of the medium in which the signals propagate, since some bands of frequency with a high coherency can be considered an invariant characteristic of the medium, as they persist over prolonged periods. (Auth.)

K-45132

Recabarren, P.G., Calderon, J.H., Lombardo, M.J., Ochoa, H.A., **Environmental conditions for astronomical observations at the Belgrano II Station** [Condiciones ambientales para la observación astronómica en la Base antártica Belgrano II], Actas de la Primera Conferencia Latinoamericana sobre Geofísica, Geodesia e Investigación Espacial Antárticas. (First Latin American Conference on Antarctic Geophysics, Geodesy and Space Research, Buenos Aires, July 30-Aug. 3, 1990. Proceedings.) Edited by A. Louro, M.A. Van Zele, and I. Velasco, ⌊Buenos Aires, Centro Latinoamericano de Física, 1990⌋, p.207-212, In Spanish. 4 refs.

The conditions which make Antarctica an ideal place for astronomical observations are reviewed, including its long periods of darkness, its solar position in summer, and its geographic location permitting the observation of eclipses only visible at high latitudes. To determine the sky quality at Belgrano II Station, observations were carried out between July 10 and Sep. 8, 1989, using a reflecting telescope 20 cm in diameter and 1 m focal length, with 10X and 15X oculars especially designed for field work. Results are analyzed and presented in tables. The preliminary conclusion is that, due to poor image quality, Belgrano II Station is not a recommended site for the installation of astronomical instruments of great value.

K-45133

Condal, A., Sánchez, R.N., **Astronomical observations in Antarctica** [Observaciones astronómicas en la antártida], Actas de la Primera Conferencia Latinoamericana sobre Geofísica, Geodesia e Investigación Espacial Antárticas. (First Latin American Conference on Antarctic Geophysics, Geodesy and Space Research, Buenos Aires, July 30-Aug. 3, 1990. Proceedings.) Edited by A. Louro, M.A. Van Zele, and I. Velasco, ⌈Buenos Aires, Centro Latinoamericano de Física, 1990⌉, p.213-221, In Spanish. 3 refs.

A methodology is proposed for reliable determination of astronomical latitudes and longitudes, and a modernization of operations, in the antarctic environment. Two classic astronomical methods used in such determinations are compared with a new method called M3; all three are explained in detail and their precision factors are shown in a table. The M3 method is found to be a positive step toward the modernization and economy of astronomical research in hostile environments.

K-45135

Rizzo Piazza, L., **Space research in Antarctica** [Pesquisas espaciais na Antártica], Actas de la Primera Conferencia Latinoamericana sobre Geofísica, Geodesia e Investigación Espacial Antárticas. (First Latin American Conference on Antarctic Geophysics, Geodesy and Space Research, Buenos Aires, July 30-Aug. 3, 1990. Proceedings.) Edited by A. Louro, M.A. Van Zele, and I. Velasco, ⌈Buenos Aires, Centro Latinoamericano de Física, 1990⌉, p.231-244, In Portuguese. 10 refs.

A review is presented of the energy and dynamics of terrestrial atmospheric physics, and of studies on the subject carried out in Antarctica. The importance of antarctic investigation of geomagnetic and ionospheric phenomena, when compared to that in the Northern Hemisphere, is stressed in the light of the advantage of Antarctica's geographic location. Various pertinent illustrations are presented, including a map showing the principal antarctic stations where studies of upper atmosphere physics phenomena are conducted.

K-45136

Recabarren, P., Ochoa, H.A., Lombardo, M., **Upper atmosphere data recording at Belgrano II Station** [Actividad de registro de datos de alta atmósfera en Base antártica Belgrano II], Actas de la Primera Conferencia Latinoamericana sobre Geofísica, Geodesia e Investigación Espacial Antárticas. (First Latin American Conference on Antarctic Geophysics, Geodesy and Space Research, Buenos Aires, July 30-Aug. 3, 1990. Proceedings.) Edited by A. Louro, M.A. Van Zele, and I. Velasco, ⌈Buenos Aires, Centro Latinoamericano de Física, 1990⌉, p.245-253, In Spanish.

The laboratory LABEL II at Belgrano II Station, its operations and the instruments used for recording geomagnetic and ionospheric data of the region, are described. Activities carried out during the last Argentine antarctic winter expedition are summarized. The advantages of computerized acquisition and control systems over the classic electronics, in the framework of high latitude operations, are pointed out. The eight most frequent problems connected with the functioning of upper air research equipment in Antarctica, such as various interferences and weather related problems, are listed.

K-45137

Cabassi, I.R., Gianibelli, J.C., Sallago, P., **Monthly averages of geomagnetic components X, Y and Z at Dumont d'Urville** [Analysis de promedios mensuales de los elementos geomagneticos X, Y, Z en el observatorio de Dumont d'Urville], Actas de la Primera Conferencia Latinoamericana sobre Geofísica, Geodesia e Investigación Espacial Antárticas. (First Latin American Conference on Antarctic Geophysics, Geodesy and Space Research, Buenos Aires, July 30-Aug. 3, 1990. Proceedings.) Edited by A. Louro, M.A. Van Zele, and I. Velasco, ⌈Buenos Aires, Centro Latinoamericano de Física, 1990⌉, p.254-264, In Spanish. 19 refs.

Methods and instruments used in the analysis of monthly averages of components X, Y and Z are described, and tabulated data are presented. It is suggested that the Maximum Entropy Method, as given by Burg, is preferable to classic methods concerning the precision of results.

K-45138

Medrano, R.A., Abdu, M.A., Batista, I.S., Muralikrishna, P., **Possible instrumental cause of an anomalous sidereal time CNI variation observed in a riometer with directional antenna at the Brazilian station in Antarctica,** Actas de la Primera Conferencia Latinoamericana sobre Geofísica, Geodesia e Investigación Espacial Antárticas. (First Latin American Conference on Antarctic Geophysics, Geodesy and Space Research, Buenos Aires, July 30-Aug. 3, 1990. Proceedings.) Edited by A. Louro, M.A. Van Zele, and I. Velasco, ⌈Buenos Aires, Centro Latinoamericano de Física, 1990⌉, p.265-271, 10 refs.

This paper reports CNI measurements performed by three riometers operating at 30 MHz frequency, at the Comandante Ferraz Station, which have been in continuous operation since Dec. 1988. All three riometers use the same type of Yagi-Uda antenna. One of the antennas is directed to the zenith, while the other two are directed to the magnetic south and west at 40 deg zenith angle, respectively. Since the first months of the riometers' operation, only one maximum of intensity was noticed from the zenithal direction as well as from the west direction, but two maxima appeared in the riometer with antenna directed to the south. This same behavior was noticed for all the days of the year and at the same sidereal hours, which revealed that the two maxima from the southward direction were not due to solar or geomagnetic effects. It is concluded that the antenna might be operating with a radiation pattern other than the expected.

K-45139

Silbergleit, V.M., Schneider, O., **Auroral ruptures observed at Belgrano II Station** [Rupturas de auroras observadas en la Base General Belgrano], Actas de la Primera Conferencia Latinoamericana sobre Geofísica, Geodesia e Investigación Espacial Antárticas. (First Latin American Conference on Antarctic Geophysics, Geodesy and Space Research, Buenos Aires, July 30-Aug. 3, 1990. Proceedings.) Edited by A. Louro, M.A. Van Zele, and I. Velasco, ⌈Buenos Aires, Centro Latinoamericano de Física, 1990⌉, p.272-282, In Spanish. 7 refs.

The potentially significant events leading to auroral break-ups are analyzed on the basis of observations carried out at Belgrano II Station in 1971. Four types of indicators are determined and described. The geomagnetic activity associated with the rupture lasts from 40 to 90 min.; it can coincide with the rupture, or precede it by 20 min., or follow it about 40 min. later.

K-45140

Rios, V.H., **Anisotropy in the polar wind plasma parameters for subsonic conditions** [Anisotropia en los parametros del plasma del viento polar para condiciones subsonicas], Actas de la Primera Conferencia Latinoamericana sobre Geofísica, Geodesia e Investigación Espacial Antárticas. (First Latin American Conference on Antarctic Geophysics, Geodesy and Space Research, Buenos Aires, July 30-Aug. 3, 1990. Proceedings.) Edited by A. Louro, M.A. Van Zele, and I. Velasco, [Buenos Aires, Centro Latinoamericano de Física, 1990], p.283-292, In Spanish. 9 refs.

The processes involved in the formation of the magnetospheric tail, and its principal function, are described. Studies of electronic anisotropy in the solar wind are reviewed. In this work, an attempt is made to simulate the polar wind by the numerical solution of continuity, moments, energy and heat flow equations, considering the plasma types of bi-Maxwellian distribution and comparing them to results obtained, which are applied to subsonic conditions.

K-45141

Zossi de Artigas, M.M., Manzano, J.R., **North and South auroral ring behavior during two substorms in Feb. 1984** [Comportamiento de los anillos aurorales norte y sur durante dos subtormentas de febrero de 1984], Actas de la Primera Conferencia Latinoamericana sobre Geofísica, Geodesia e Investigación Espacial Antárticas. (First Latin American Conference on Antarctic Geophysics, Geodesy and Space Research, Buenos Aires, July 30-Aug. 3, 1990. Proceedings.) Edited by A. Louro, M.A. Van Zele, and I. Velasco, [Buenos Aires, Centro Latinoamericano de Física, 1990], p.293-301, In Spanish. 5 refs.

Analysis of effects of two substorms which occurred on Feb. 10 and 12, 1984, on auroral ring behavior in both hemispheres reveals the following: the effects of the disturbances are significant in both auroral zones; there was an auroral electrojet with western direction, significant in the night sector and extending toward higher latitudes; and asymmetric effects in the auroral rings were observed.

K-45142

Cazeneuve, H.A., **Magnetospheric response to the passages across the heliographic current,** Actas de la Primera Conferencia Latinoamericana sobre Geofísica, Geodesia e Investigación Espacial Antárticas. (First Latin American Conference on Antarctic Geophysics, Geodesy and Space Research, Buenos Aires, July 30-Aug. 3, 1990. Proceedings.) Edited by A. Louro, M.A. Van Zele, and I. Velasco, [Buenos Aires, Centro Latinoamericano de Física, 1990], p.302-311, 14 refs.

The present study encompasses a long period of geomagnetic observations at the antarctic stations, which starts with the dark period of 1972 and extends until the present. Several hundred passages of the Earth across the heliographic current sheet occurred during this period. In order to unravel the common trends at the antarctic stations, the intense storms from periods of minimum solar activity, such as 1974-77, are selected. Two periodicities are found in the patterns of geomagnetic activity at the antarctic stations. One is defined by the enhanced activity following the sector crossings, and the decline that trails such an enhancement, occurring between two successive sector boundary crossings. The other one consists of the daily cycles of activity occurring during the first portion of the active periods.

K-45144

Recabarren, P.G., Solinas, M.A., **Digital processing of austral aurora images** [Procesamiento digital de imágenes de auroras australes], Actas de la Primera Conferencia Latinoamericana sobre Geofísica, Geodesia e Investigación Espacial Antárticas. (First Latin American Conference on Antarctic Geophysics, Geodesy and Space Research, Buenos Aires, July 30-Aug. 3, 1990. Proceedings.) Edited by A. Louro, M.A. Van Zele, and I. Velasco, [Buenos Aires, Centro Latinoamericano de Física, 1990], p.323-329, In Spanish. 1 ref.

The computer techniques of the Digital Processing of Images (DPI) are applied in this study to the images of austral auroras, although no specific methodology or acquisition and processing system has been developed. The equipment and technique employed in this particular case are described in detail. Some difficulties encountered in this otherwise successful application of DPI are outlined.

K-45162

Bowman, G.G., **Daytime high-latitude trough and its possible association with travelling ionospheric disturbances,** *Annales geophysicae,* July 1991 9(7), p.476-486, 40 refs.

An analysis of ionograms from Ellsworth, Antarctica has shown that the size of the daytime trough (as determined by the equatorward slope in the isoionic contours) is a function of geomagnetic activity. The trough activity is more intense and the onset times are earlier for higher geomagnetic activity. The principal features of the daytime trough are compared with similar features observed for mid-latitude spread-F events. Evidence is presented to suggest that the day-to-day observation of the trough is a consequence of the passage of travelling ionospheric disturbances (TIDs) which originate around noon in the polar-cusp region (at approximately 80 deg CGlat). The different onset times are seen as a consequence of disturbance speeds also being a function of geomagnetic activity. Recent reports of the detection of TIDs in these daytime-trough regions are discussed. (Auth. mod.)

K-45309

Besprozvannaia, A.S., Lukashkin, V.M., Troshichev, O.A., Shirochkov, A.V., **Results and plans of polar geophysical studies** [Itogi i perspektivy poliarnykh geofizicheskikh issledovaniĭ], *Problemy arktiki i antarktiki,* 1991 Vol.66, p.129-140, In Russian with English summary. 36 refs.

Results of geophysical studies in polar regions carried out over the last 10 years are presented. Measurement data obtained by vertical and oblique radiosounding of the ionosphere was used. Special attention is given to the study of large-scale structures of the high-latitude ionosphere and statistical characteristics of magnetic disturbance fields, progress in the theoretical and empirical modelling of electron concentration, and the development of statistical methods for predicting radiowave propagation in the decameter range. It is later planned to expand the studies to fine structures of high-latitude geophysical phenomena. (Auth. mod.)

K-45333

Kim, J.S., **Thermospheric temperatures measured at King Sejong Station, Antarctica,** *Korean journal of polar research,* June 1991 2(1) (Special issue), Second International Symposium on Antarctic Science, Seoul, Korea, Sep. 17-18, 1990. [Proceedings], p.203-211, 7 refs.

Previous measurements and associated theoretical studies indicated that the polar region plays a critical role in the overall thermospheric dynamics. Recently, in order to investigate the neutral temperatures and winds in the antarctic thermosphere, a high-resolution Fabry-Perot interferometer was installed at King Sejong Station. Interferometric measurements during Mar. 1989 showed unusually elevated thermospheric temperatures. This elevation may be due partly to major solar events that occurred in Mar. Initial comparisons of the observed temperature data with calculated values from semi-empirical MSIS thermospheric models showed consistent and significant differences, both qualitatively and quantitatively, between measured temperatures and calculated values. (Auth.)

K-45371

Nagano, H., Sato, N., Ayukawa, M., **CNA pulsations associated with geomagnetic sudden commencements,** NIPR Symposium on Upper Atmosphere Physics, Proceedings. No.4, Tokyo, National Institute of Polar Research, 1991, p.42-50, 17 refs.

In the cosmic radio noise absorption (CNA) data obtained at Showa Station, CNA pulsations were sometimes observed following geomagnetic sudden commencements (SC's). In order to investigate characteristics of the occurrence, 138 SC events were analyzed using 1-second CNA and geomagnetic data at Showa Station from Apr. 1981 to Dec. 1986. Local time dependence can be seen in the SC-associated CNA pulsation (CNA Psc). The occurrence rate is highest in the morning and has a secondary peak before midnight, showing a marked dawn-dusk asymmetry. CNA Psc accompanies geomagnetic Psc at the time of strong CNA increase caused by large SC's with high pre-SC *AE* index. CNA Psc tends to be correlated with the *H* component of magnetic Psc in the Psc 5 period range and the D component for shorter periods in the Psc 4 range. (Auth.)

K-45372

Shibuya, S., Higuchi, Y., Sato, N., Maezawa, K., **Conjugacy of CNA pulsations and their source movement in the auroral zones,** NIPR Symposium on Upper Atmosphere Physics, Proceedings, :No.4, Tokyo, National Institute of Polar Research, 1991, p.51-61, 9 refs.

A statistical character of seasonal variation for the conjugacy of quasi-periodic cosmic radio noise absorption (CNA) is studied from measurements at Showa Station and its magnetically conjugate Husafell Station in Iceland. On the basis of the analyses of relative phase difference of the CNA pulsation for two cases among three stations in Iceland, the direction of source movement is also studied. Results indicate that the sources of CNA pulsation of Pc 3 and Pc 5 range in the prenoon sector moved generally from north (or high latitude) to south (or low latitude), and from east to west. The source of CNA pulsation at Pc 5 range in the morning sector moved primarily from south to north and from east to west. (Auth.)

K-45390

Sazhin, S.S., **Group delay times of whistler-mode signals from VLF transmitters observed at Faraday, Antarctica,** *Journal of atmospheric and terrestrial physics,* Jan. 1992 54(1), p.99-107, 16 refs.

The group delay times (tg) of whistler-mode waves generated by the NAA and NSS U.S. Navy transmitters and recorded at Faraday, after following a ducted field-aligned path, are analysed theoretically for different L- shells of propagation using models of electron density, temperature, and ion composition distribution for typical day and night-time conditions. tg is presented as the sum of (1) a group delay time calculated for the simplest model of wave propagation parallel to the magnetic field in a cold, dense plasma with the effects of ions neglected (tg 0) and (2) the corrections due to finite electron density; that is, finite ratio of electron plasma frequency to electron gyrofrequency, contribution of ions, and non-zero electron temperature. (Auth.mod.)

K-45391

Price, G.D., Jacka, F., **Influence of geomagnetic activity on the upper mesosphere/lower thermosphere in the auroral zone. I. Vertical winds,** *Journal of atmospheric and terrestrial physics,* Oct. 1991 53(10), p.909-922, 27 refs.

A scanning Fabry-Perot spectrometer (FPS) located at Mawson Station was used to obtain vertical wind, temperature, and emission intensity measurements from the lambda558 nm emission of atomic oxygen. The measured temperature is used to assign an approximate emission height to the observations. A spaced-antenna partial-reflection radar was run concurrently with the FPS from which the presence of enhanced ionization in the *D*-region could be inferred from the return heights and strengths of the echoes. Large upward winds of approximately 30 m/s at altitudes less than 110 km appear to be a direct response of the neutral atmosphere to intense auroral events. It is suggested that the observed upwelling is a result of particle heating at heights below the principal emission height. At higher altitudes, vertical winds of a similar magnitude are also measured during geomagnetically disturbed conditions, although here they do not appear to be associated with particular auroral events. In this case it is suggested that upwelling is produced by a combination of Joule and particle heating. (Auth.)

K-45392

Price, G.D., Jacka, F., Vincent, R.A., Burns, G.B., **Influence of geomagnetic activity on the upper mesosphere/lower thermosphere in the auroral zone. II. Horizontal winds,** *Journal of atmospheric and terrestrial physics,* Oct. 1991 53(10), p.923-947, Numerous refs.

A spaced antenna partial reflection radar located at Mawson has been used to measure the horizontal wind field in the height range 70-110 km. Three years of data (1985-1987) from the radar have been analyzed to investigate correlations between geomagnetic activity and the horizontal wind. Results are analyzed using a randomization technique, and show that larger winds are measured during geomagnetically active periods in both the raw wind values and in the medium-frequency and high-frequency components. The raw winds tend to be shifted towards the geographic NW to NE quadrant in the early morning hours during high *K*-times. The observed correlation is seen down to 86 km and shows a seasonal dependence. The mean r.m.s. velocity of the radar scatterers and the angular spread of the return echoes correlate with geomagnetic activity. The medium- and high-frequency components of the wind are polarized in the magnetic zonal direction during all seasons of the year. (Auth.)

K-45464

Du, J.H., Sun, X.R., **HF field strength measurements over a very long distance,** *Antarctic research,* June 1991 2(1), p.60-67, 8 refs.

There is a large gap between the theoretical values and experimental medians of the field strength of RWM and RID signals during high solar activity periods at the Great Wall Station. The calculated values are, on average, less than the experimental, especially on the propagation path between RID and Antarctica. The experimental field strength may be used as basic data for the research of HF propagation over a very long distance. Because of the large deviation, it is necessary to study HF propagation over a very long distance in detail, especially the propagation model. (Auth.)

K-45597

Duldig, M.L., **Variation of high-energy cosmic radiation,** 1991-1992 Australian Antarctic Research Program. Antarctic Treaty exchange information: Supplement A to particulars for ANARE, Kingston, Tasmania, 1991, p.271-274.

The principal aim of the project is to contribute to worldwide studies of spatial asymmetries (anisotropies) and of transients in cosmic ray charged-particle radiation at moderately high energies, and to elucidate particular features of the phenomena observed with surface and underground telescopes at Mawson. The secondary aim is to take part in other collaborative projects involving the network of high-energy observing stations, for which the observations at Mawson are of value or which have important implications for the Mawson observations.

K-45727

Fligel, M.D., **Large-scale irregularities of electron concentration in the southern magnetic anomaly area according to Intercosmos 19 satellite data,** *Journal of atmospheric and terrestrial physics,* Feb. 1992 54(2), p.173-178, 15 refs.

Using Intercosmos 19 satellite topside sounding data, a type of complex ionogram for which the lowest frequency of the radio-wave which has passed through the ionosphere is smaller than the greatest frequency of the radio-wave reflected from the ionosphere is considered. (Under normal conditions these frequencies are identically equal.) A mechanism is suggested by which radio-waves transmitted by the satellite propagate over 3000 km in the topside ionosphere in the presence of inclined large-scale plasma structures, which can explain the main features of such ionograms. The space-time distribution of this phenomenon on a global scale is analyzed. It is shown that it manifests itself mainly in the local winter, in the daytime and in the Southern Hemisphere. It is hypothesized that these large-scale irregularities are formed in the vicinity of the South Atlantic magnetic anomaly, and then move westward. The Southern Hemisphere area included in this study extends to 70S, taking in the northern Antarctic Peninsula and some of the antarctic coastal regions. (Auth. mod.)

K-45741

Craven, J.D., Murphree, J.S., Frank, L.A., Cogger, L.L., **Simultaneous optical observations of transpolar arcs in the two polar caps,** *Geophysical research letters,* Dec. 1991 18(12), p.2297-2300, 22 refs.

Optical observations with DE 1 and Viking demonstrate conclusively that transpolar arcs can be present simultaneously at polar latitudes in both hemispheres. The arcs observed here are aligned parallel to one another on opposite sides of the magnetic pole, and relative to the noon-midnight meridian are rotated slightly in the counterclockwise direction when viewed from above the North Pole. (Auth.)

K-45752

Wu, Q., Rosenberg, T.J., **High latitude pulsating aurorae revisited,** *Geophysical research letters,* Jan. 3, 1992 19(1), p.69-72, 14 refs.

Dayside auroral pulsations (10-40 s periods) have been studied for different levels of geomagnetic disturbance with N2+427.8 nm emission data obtained at South Pole Station. The occurrence distribution exhibits a single peak at magnetic noon under geomagnetically quiet conditions. With increased Kp, the distribution shifts to earlier times, the peak occurring at 1000-1030 MLT for 1 C/ E Kp C4. At these higher Kp levels a secondary occurrence peak is evident in the afternoon sector between 1400 and 1600 MLT, occurring earlier as Kp increases. These results are compared with those obtained separately for pre-noon pulsations observed at Ny Alesund and post-noon pulsations observed at Davis, Northern and Southern Hemisphere sites at approximately the same magnetic latitude as South Pole. South Pole and Ny Alesund observe morning peaks at the same time and with a similar lack of Kp dependence; South Pole and Davis observe afternoon peaks with similar Kp dependence, though the peak occurs earlier at Davis. In contrast to the results from the earlier studies, the South Pole observations show larger pulsation amplitudes in the morning sector and significantly higher occurrence rates overall. (Auth.)

K-45890

Martínez de Garat, A., **Study of the south hemisphere F2 region winter anomaly,** *Revista de geofisica,* 1989 45(2), p.211-215, With Spanish summary. 7 refs.

An analysis of the behavior of the ionospheric parameter foF2 to study the winter F2 region has been made. In order to give an opinion about the existence of the so-called winter anomaly, the foF2 behavior during the local winter and summer for an important number of stations around the world has been studied. The analyzed data, which correspond to two solar cycles for Jan. and July, were also compared with the solar activity. Associated with the winter anomaly and in order to be able to decide both its presence and its magnitude, it is proposed to work with a certain index. The following conclusions could be considered the most important: 1) with respect to the F2 region winter anomaly, the north hemisphere behavior differs substantially from the southern one, and 2) the F2 region winter anomaly must be redefined, since in the author's analysis only the north hemisphere shows the "anomalous" behavior. Data from Port Stanley in the Falkland Is. and from Argentine Is. near the Antarctic Peninsula are included. (Auth. mod.)

K-45979

Von Biel, H.A., **Ionisation in the antarctic stratosphere,** *Journal of atmospheric and terrestrial physics,* Mar./Apr. 1992 54(3/4), p.235-242, 21 refs.

Results from a partial reflection radar experiment, operated at a frequency of 2.9 MHz at Scott Base, are presented for the time interval from Jan. 1987 to June 1991. It is shown that a layer of ionization can frequently be identified at scattering heights between 40 and 55 km. Details regarding the maximum density, thickness, and frequency of occurrence of this ionization layer are presented. From sequential occurrences of the ionization an approximate lifetime of 70 min is deduced for the layer. The possibility that the ionization layer is produced by a flux of relativistic electrons is investigated. (Auth.)

K-46050

Mielke, T.A., Elkins, C.J., Helliwell, R.A., Inan, U.S., **Excitation of whistler mode signals via injection of polarized VLF waves with the Siple transmitter,** *Radio science,* Jan./Feb. 1992 27(1), p.31-46, 14 refs.

Whistler mode waves of various polarizations were transmitted by the Siple Station VLF transmitter and received near the geomagnetic conjugate point at Lake Mistissini, Quebec. Crossed 21 km horizontal dipole antennas on top of the 2 km thick ice sheet were used to transmit 2- to 4-kHz waves alternately with right-hand circular, left-hand circular, and linear polarizations. Excitation of a multiplicity of magnetospheric propagation paths and the received signal strength were observed to depend on the transmitter antenna polarization. Where whistler mode growth and emission triggering occurred, saturated peak values of received signals were independent of antenna polarization and initial injected power levels, in agreement with previous findings. Propagation paths of ducted Siple signals observed at Lake Mistissini were identified with propagation paths deduced from natural whistlers, from which the *L* shell values and equatorial number densities for the paths were calculated. A combination of *L* shell data and models of antenna coupling into the whistler mode may aid in the location of ducts. Dynamics Explorer 1 satellite recordings of unducted Siple signals showed trends similar to the ground data on ducted signals. The observations are discussed in the context of a simplified model of the coupling from the Siple antenna into the ionosphere, which provides reasonable agreement with observations. (Auth.)

K-46077

De Amici, G., **Temperature of the cosmic microwave background radiation at 3.8GHz: results of a measurement from the South Pole site,** *Astrophysical journal,* Nov. 1, 1991 381(1,Pt.1), p.341-347, 19 refs.

As part of an international collaboration to measure the low-frequency spectrum of the cosmic microwave background (CMB) radiation, its temperature was measured at a frequency of 3.8 GHz, during the austral spring of 1989, obtaining a brightness temperature, T(CMB), of 2.64 +/- 0.07 K (68% confidence level). The new result is in agreement with previous measurements at the same frequency obtained in 1986-88 from a very different site and has comparable error bars. Combining measurements from all years, T(CMB)=2.64 K is obtained. (Auth.)

K-46179

Hansen, H.J., **High latitude Pc 1 bursts arising in the dayside boundary layer region,** *Journal of geophysical research,* Apr. 1, 1992 97(A4), p.3993-4008, Refs. p.4007-4008.

Dayside Pc 1 geomagnetic pulsation bursts have been studied using a three-station array of induction magnetometers located at high latitudes. The data set reveals that when these emissions are continually recorded at Davis Station, the low-latitude cleft, observed by the DMSP F7 satellite, is located at the Davis latitude. Associated magnetic variations in the form of solitary pulses often lead the Pc 1 bursts by 1 to 2 min. These pulses are typically associated with riometer absorption events and consequently the precipitation of fluxes of keV electrons. The Pc 1 bursts are interpreted as resulting from ion cyclotron waves which have propagated to the ionosphere from the equatorial boundary layer region. The associated boundary layer ions, identified by the low-altitude DMSP F7 satellite, range between 1 and 5 keV in energy. These particles are considered to be the most likely free energy source for the ion cyclotron waves. It is considered that such resonant ions enter the magnetosphere via the cleft and cusp, because this enables the prenoon time of occurrence of most of the observations to be explained. (Auth. mod.)

K-46181

Kadokura, A., **Upper atmosphere physics data, Syowa and Asuka Stations, 1989,** *Japanese Antarctic Research Expedition. JARE data reports,* Feb. 1992 No.171, 335p., 10 refs.

The report summarizes upper atmosphere physics data acquired by the Upper Atmosphere Physics Monitoring System at Showa and Asuka Stations in 1989. The items of observations at both stations are as follows: geomagnetism; ionosphere (cosmic noise absorption at 30MHz); and aurora (meridian scanning record at 3 wavelengths). ELF-VLF waves were observed at Showa Station only. The systems were installed at Showa Station in Jan. 1981, and at Asuka in Jan. 1987. An outline of the systems, specifications of the observation instruments, the recording periods, and the format of the compiled digital data are included. Magnetograms and frequency-time spectra of magnetic pulsations for Jan. 1-Dec. 31, 1989 at both stations are given in Appendices 1 and 2.

K-46187

Cazeneuve, H., Grinspon, M., **Prediction of geomagnetic activity at high austral latitudes,** *Revista de geofisica,* 1990 46(2), p.193-197, 13 refs. For Spanish original see 19K-44698.

Results of an application of linear predictive theory to the prediction of magnetic activity are presented. Data from 7 antarctic stations and solar wind parameters have been used. The approximation of the predicted time series is quantitatively estimated by computing the prediction efficiency. Since an approximately linear association between geomagnetic variations and those of the interplanetary electric field is apparent, it is found that the magnetosphere responds like an approximately linear system. The study shows that geomagnetic variations at antarctic stations can be reasonably predicted by applying a deformation, by means of a linear filter, to the interplanetary parameters. The filter function attains a first maximum within one hour after the initial power input, and a secondary maximum 5 hours later. This indicates a rapid response following the power input from the solar wind, and a delayed excitation, which in turn is followed by several damped oscillations. (Auth.)

K-46415

Hamar, D., **Trace splitting of whistlers: a signature of fine structure or mode splitting in magnetospheric ducts,** *Radio science,* Mar.-Apr. 1992 27(2), p.341-346, 8 refs.

Previously, the discovery of fine structure in whistler data received on the ground at Halley was reported. This structure was not apparent in conventional spectral analysis but was revealed by the technique of digital matched filtering. A larger data set was examined and a commonly observed phenomenon is that single whistler traces become split into two, over various frequency ranges. The splitting is typically 5-15 ms and extends over frequency ranges of a few hundred hertz which may occur anywhere between the upper and lower cutoff frequencies of the whistler. The splitting may be either symmetrical or unsymmetrical with respect to the unsplit trace. The effect is unlikely to arise in the spectrum of the lightning source or from propagation under or through the ionosphere. It may, however, be a signature of field-aligned fine spatial structure in plasmaspheric density, and hence refractive index, in the whistler duct. For simple longitudinal propagation, electron density fluctuations of the order of 1% and spatial scale sizes of the order of 50 km in the equatorial plane are implied. It seems possible that the observations could also be interpreted in terms of the mode theory of ducted propagation, assuming the excitation of two modes with group velocities differing by a few tenths of a percent. (Auth. mod.)

K-46425

Hoegy, W.R., Grebowsky, J.M., **Dependence of polar hole density on magnetic and solar conditions,** *Journal of geophysical research,* Apr. 1, 1991 96(A4), p.5737-5755, 21 refs.

The dependence of electron density in the polar *F* region ionization hole on solar activity, universal time (UT), magnetic activity, season, and hemisphere is studied using data from the Langmuir probes on Atmosphere Explorer C and Dynamics Explorer 2. The AE-C data were obtained during solar minimum when the 3-month average 10.7 cm solar flux index varied from 70 to 140; the DE 2 data were obtained near solar maximum when the 10.7 cm solar flux index varied from 120 to 220. The polar hole is a region on the nightside of the polar cap where reduced ionization exists because of the long transport time of ionization from the dayside across the polar cap. The behavior of this region as a function of 10.7 cm solar flux (*F* 10.7), UT, and *Kp* is statistically modeled for equinox, summer, and winter conditions for each hemisphere separately. The strongest dependencies are observed in *F* 10.7 and UT; the *Kp* dependence is weak because it poorly represents the complexities of convection across the polar cap. A strong hemispherical difference due to the offset of the magnetic poles from the Earth's rotation axis is observed in the UT dependence of the ionization hole. There is an overall asymmetry in the density level between hemispheres; it was found that the winter hole density is about a factor of 10 greater in the north than in the south. (Auth. mod.)

K-46463

Kainuma, S., Inamori, K., Otsuka, A., **HF field strength data measured at Syowa Station, Antarctica from Jan. to Dec., 1988,** *Japanese Antarctic Research Expedition. JARE data reports,* Nov. 1991 No.170, 20p., 1 ref.

This report summarizes the results of field strength measurements of JJY 8 MHz for Jan.-Dec. 1988. Additional information is provided on observers, particulars of the transmitter and receiver, derivation of the skywave field strength, monthly tabulation sheets, and diurnal variations of the field strength.

K-46465

Ohtaka, K., Igarashi, K., **Records of radio aurora at Syowa Station, Antarctica in 1990,** *Japanese Antarctic Research Expedition. JARE data reports,* Mar. 1992 No.175, 34p., 1 ref.

A summary of data obtained with the auroral radar at Showa Station during 1990 is presented. The available data include chart records of the time variation of echo intensity, digital MT, and 35 mm film records of radio auroral echo intensity (A-scope) and range-time intensity (A'-scope). A brief explanation of diagrams and a bibliography relevant to records of radio aurora at Showa Station between 1966 and 1989 are also presented.

K-46466

Ohtaka, K., Kunitake, M., **Riometer records of 30 MHz cosmic noise at Syowa Station, Antarctica in 1990,** *Japanese Antarctic Research Expedition. JARE data reports,* Mar. 1992 No.176, 204p.

At Showa Station, absorption of cosmic radio noise has been observed with a standard riometer (relative ionospheric opacity meter) at 30 MHz, since Feb. 1966. This report presents data observed from Jan. 1 to Dec. 31, 1990, in the format of hourly values and combined data plots. Other observation data are presented for reference. These data include geomagnetic field, HF, VLF and radar observations. A bibliography relevant to riometer records of 30 MHz cosmic noise at Showa Station between 1967 and 1989 is included.

K-46508

Hillas, A.M., **South Pole Air Shower Experiment,** *Antarctic journal of the United States,* 1990 25(5), p.270-271, 8 refs.

The Bartol-Leeds gamma-ray SPASE telescope, designed for astronomy above 50 teraelectronvolts, was brought into operation during the 1987-1988 summer. In this article, an update is given on the telescope, and preliminary results are presented from the analysis of 6 months of data recorded during the period Mar.-Sep. 1988. A figure shows the current layout of the 1-sq m plastic scintillators which form the SPASE array.

K-46509

Jefferies, S.M., Pomerantz, M.A., Duvall, T.L., Jr., Harvey, J.W., **Helioseismology from South Pole: Solar cycle connection,** *Antarctic journal of the United States,* 1990 25(5), p.271-272, 9 refs.

The structure and dynamics of the solar interior can be probed by measuring the frequencies of solar global acoustic oscillations. This technique, known as helioseismology, is described. A report is presented of observations made in Dec. 1981, Nov. 1987, and Nov. 1988, at the Amundsen-Scott Station, during high and low solar activity. The first significant result is that the frequencies of solar oscillations with spherical harmonic degrees between 6 and 98 are systematically about 0.01% greater when solar activity is high. It was also found that the internal rotation of the Sun did not change significantly as a function of solar activity, and that the lifetime of oscillation modes varies with the solar cycle.

K-46510

Walker, A., **Operation of an atmospheric Cherenkov telescope at the South Pole,** *Antarctic journal of the United States,* 1990 25(5), p.273-275, 2 refs.

A preliminary report on the operation of a simple gamma- ray telescope, P-SPACE (Pilot-Atmospheric Cherenkov Experiment at the South Pole), during the winter of 1989 is presented. Four objectives of the experiment are summarized, with the following conclusions: that an atmospheric Cherenkov telescope can be operated as easily at the South Pole as at any other site; that the aurora will not seriously restrict the operation of atmospheric Cherenkov telescopes at the South Pole, as it is not nearly as restrictive as the cloud cover; that the Large Magellanic Cloud is not detected at the level of sensitivity of approximately 10 teraelectronvolts; and that the arrival direction determination of air showers by SPASE is better than previously estimated.

K-46511

Chen, K.Y., Terrell, D., **Azimuthal variation of stellar magnitudes at the South Pole,** *Antarctic journal of the United States,* 1990 25(5), p.275-276, 2 refs.

Photoelectric observations of 8 stars were made in 1988 for determining atmospheric extinction at the Amundsen-Scott Station. An azimuthal variation of the visual magnitude was found; stars appeared to be fainter around the azimuth of 120 deg. It is suggested that the exhaust gas from the station power generator was the likely cause of this variation.

K-46512

Bieber, J.W., Evenson, P., Pomerantz, M.A., **Unusual cosmic ray spike,** *Antarctic journal of the United States,* 1990 25(5), p.277-278, 2 refs.

During a 4-month period beginning July 25, 1989, the Sun released an unprecedented barrage of 7 relativistic solar-particle events which could be detected with ground-based instruments. Neutron monitor observations of a ground-level enhancement which began on Oct. 22, 1989 are presented in a figure. The time profile recorded in Thule, Greenland, is fairly representative of a normal ground-level enhancement time profile; in contrast, those recorded simultaneously at Amundsen-Scott and McMurdo stations do not look normal because of the presence of a huge spike at event onset. At this point the physical cause of the cosmic ray spike remains unclear.

K-46513

Hernandez, G., Clark, K.C., Smith, R.W., Kauffman, S.D., **South Pole mesospheric and lower-thermospheric dynamics,** *Antarctic journal of the United States,* 1990 25(5), p.278-279.

An optical experiment at Amundsen-Scott Station, using an automatically scanned Fabry-Perot spectrometer, is described. The instrument began mesosphere and lower thermosphere observations during early Apr. 1990 and has supplied data for several days when the sky was clear. Samples of winds observed using the OH 11902 K emission at a height of about 87 km are shown in a figure. There is a long-term variation similar to a 12-hour tide underlying the expected fluctuations. A different wind pattern is seen for the atomic oxygen 17924 K green line data on the same day, shown in another figure, indicating the change of regime above the mesopause. A strong resemblance to the ionospheric convection-driven wind pattern of the upper thermosphere can be noted. This can be seen in the figure as strong anti-Sunward wind near magnetic midnight.

K-46514

Detrick, D.L., Rosenberg, T.J., **Geometrical factors affecting the frequency dependence of auroral absorption,** *Antarctic journal of the United States,* 1990 25(5), p.280-283, 5 refs.

The results are presented from an intense dusk-side absorption event, which exhibited arc-like structure, and is typical of the absorption events observed at the Amundsen-Scott Station during that local time. The event occurred on June 15, 1988 near 2205 universal time, and reached a magnitude in excess of 6.5 decibels in the IRIS data. This was a large absorption event but not the largest observed with the IRIS instrument. Magnetic midnight at South Pole is about 0330 universal time, so this event occurred about 5 hours pre-midnight. The results shown are representative of those obtained from the events examined. Those events which are associated with small-spatial-scale precipitation regions show deviation of the spectral index from the theoretical value of 2; those events which cover the entire field of view of the broadbeam antenna show no deviation. No event was found in the broadbeam data which was not consistent with the simulation using the IRIS data.

K-46515
Cahill, L.J., Jr., Engebretson, M.J., Arnoldy, R.L., **Magnetic pulsations in the polar cap,** *Antarctic journal of the United States,* 1990 25(5), p.283-284, 3 refs.

It is found that pulsations in the polar cap are strongly affected by auroral oval activity, and not only when the Amundsen-Scott Station is under the dayside auroral oval and cusp, 0430 to 1430 magnetic local time. There is also an evening maximum of activity seen in the averaged data, 2030 to midnight magnetic local time, presumably related to evening auroral oval activity. This activity is seen as bursts of pulsations on individual days, occurring at random times in the evening. Although the bursts on individual days occur at random times, when the data is averaged a broad evening maximum is produced.

K-46516
Byrne, G.J., Benbrook, J.R., Bering, E.A., **Ultraviolet radiation in the stratosphere: implications for photoelectric contamination of measurements from antarctic balloon campaigns,** *Antarctic journal of the United States,* 1990 25(5), p.285-286, 6 refs.

The contamination of electrical measurements in the stratosphere using balloonborne double-probe systems has been observed, caused by local photoelectric emissions. The solar ultraviolet radiation responsible for the photoemissions are primarily those in the range of 190-230 nanometers. At these wavelengths the atmosphere is partially transparent, allowing a large flux of energetic photons to penetrate deep into the stratosphere. In future antarctic balloon campaigns which will employ double-probe instruments, photoemissions may introduce variations in the electrical measurements as functions of solar angle and altitude that may be misinterpreted as diurnal, latitudinal, or altitudinal variations of a geophysical nature.

K-46586
Troshichev, O.A., Nishida, A., **Pattern of electron and ion precipitation in northern and southern polar regions for northward interplanetary magnetic field conditions,** *Journal of geophysical research,* June 1, 1992 97(A6), p.8337-8354, 37 refs.

Using the data of the DMSP F6 and F7 satellites, the authors show that there is a systematic difference between ion precipitation in the auroral oval and in the polar cap. Four patterns of electron precipitation in the polar cap are identified for northward IMF conditions: symmetric precipitation in both polar caps with no distinct regularity; symmetric precipitation with a prevalence of electron fluxes in the morning sector of both polar caps; asymmetric distribution with no correspondence between patterns in the opposite polar regions; and asymmetric distribution where the increased electron fluxes are observed in opposite sectors (morning or evening) of the opposite polar caps depending on the polarity of the By IMF component. The energy spectra of electrons even in neighboring spikes in the same polar cap may be greatly different, and therefore discrepancy in electron spectra in opposite polar caps cannot be regarded as unique proof for the open character of the magnetic field lines. (Auth. mod.)

K-46613
Pereira, E.B., ed, Kirchhoff, V.W.J.H., ed, **Atmospheric and space sciences in Antarctica. First Seminar on Atmospheric and Space Sciences of the Brazilian Antarctic Program, São José dos Campos, Apr. 27-29, 1988. Proceedings** [Ciências atmosféricas e espaciais na Antártica. Anais do I Seminário Sobre Ciências Atmosféricas e Espaciais do Programa Antártico Brasileiro, São José dos Campos, SP, 27 a 29 de abril de 1988], Brazil, Instituto de Pesquisas Espaciais, 1989, 317p., In Portuguese. Refs. passim. For individual papers see A-46629 through A-46632, I-46618 through I-46627, K-46614 through K-46617 and K-46628.

This is a collection of papers presented at the First Seminar on Atmospheric and Space Sciences, reporting results of investigations conducted during the first 6 years of the Brazilian Antarctic Program. The papers are arranged in the following categories: astrophysics, upper atmosphere, lower atmosphere, meteorology, and instrumentation and techniques. Associated topics deal with environmental issues in general, and Brazilian antarctic policy in particular.

K-46614
Jayanthi, U.B., **X and gamma ray background observations in Antarctica,** Ciências atmosféricas e espaciais na Antártica. Anais do I Seminário Sobre Ciências Atmosféricas e Espaciais do Programa Antártico Brasileiro. (Atmospheric and space sciences in Antarctica. First Seminar on Atmospheric and Space Sciences of the Brazilian Antarctic Program, São José dos Campos, Apr. 27-29, 1988. Proceedings.) Edited by E.B. Pereira and V.W.J.H. Kirchhoff, Brazil, Instituto de Pesquisas Espaciais, 1989, p.1-15, 14 refs.

Atmospheric X and gamma rays are products of complex electromagnetic interactions between charged particles and atmospheric constituents. The latitudinal dependence of the cosmic ray secondaries, auroral and South Atlantic Anomaly phenomena produce flux variations, especially the later temporal flux variations. These variations are discussed in relevance to balloon flight observations of X and gamma ray atmospheric background at polar latitudes. (Auth.)

K-46615
Neto, T.V., **Anisotropy measurements in Antarctica of the cosmic background radiation** [Medidas na Antártica da anisotropia da radiação cósmica de fundo], Ciências atmosféricas e espaciais na Antártica. Anais do I Seminário Sobre Ciências Atmosféricas e Espaciais do Programa Antártico Brasileiro. (Atmospheric and space sciences in Antarctica. First Seminar on Atmospheric and Space Sciences of the Brazilian Antarctic Program, São José dos Campos, Apr. 27-29, 1988. Proceedings.) Edited by E.B. Pereira and V.W.J.H. Kirchhoff, Brazil, Instituto de Pesquisas Espaciais, 1989, p.16-27, In Portuguese with English summary. 14 refs.

The angular distribution of the cosmic background radiation and the need for an experiment in an intermediate angular scale (1 deg <theta< 10 deg) are discussed. This is a region that is not well investigated and where the theoretical predictions can be tested. (Auth.)

K-46616

Trivedi, N.B., Padilha, A.L., Da Costa, J.M., **Geomagnetic and geoelectric pulsations at Comandante Ferraz Station** [Micropulsações geomagnéticas e geoelétricas na estação antártica Comandante Ferraz], Ciências atmosféricas e espaciais na Antártica. Anais do I Seminário Sobre Ciências Atmosféricas e Espaciais do Programa Antártico Brasileiro. (Atmospheric and space sciences in Antarctica. First Seminar on Atmospheric and Space Sciences of the Brazilian Antarctic Program, São José dos Campos, Apr. 27-29, 1988. Proceedings.) Edited by E.B. Pereira and V.W.J.H. Kirchhoff, Brazil, Instituto de Pesquisas Espaciais, 1989, p.29-39, In Portuguese with English summary. 10 refs.

Geomagnetic and geoelectric pulsations in the range from 10 to 500 seconds are recorded at Comandante Ferraz Station on the Antarctic Peninsula. The characteristics of the PC3 and PC4 micropulsations are studied and discussed in terms of hydromagnetic waves generated at the sunward side of the earth's magnetosphere. The same measurements are also used to obtain a local conductivity profile of the earth's crust and upper mantle, using principles of electromagnetic induction. (Auth.)

K-46617

Balboa, R.A.M., Abdu, M.A., Batista, I.S., **Ionospheric research in Antarctica: cosmic noise measurements** [Pesquisas ionosféricas na Antártica: medidas de ruído cósmico], Ciências atmosféricas e espaciais na Antártica. Anais do I Seminário Sobre Ciências Atmosféricas e Espaciais do Programa Antártico Brasileiro. (Atmospheric and space sciences in Antarctica. First Seminar on Atmospheric and Space Sciences of the Brazilian Antarctic Program, São José dos Campos, Apr. 27-29, 1988. Proceedings.) Edited by E.B. Pereira and V.W.J.H. Kirchhoff, Brazil, Instituto de Pesquisas Espaciais, 1989, p.40-61, In Portuguese with English summary. 9 refs.

Two riometers with antennas pointing one to the zenith and the other inclined to the south were installed and operated during the summer season of 1987-1988 at Comandante Ferraz Station. Preliminary results identifying an apparent seasonal behavior in the ionospheric absorption, observed in the cosmic noise intensity recorded by the inclined antenna, and some energetic particle precipitation events, are presented. The present experiment with riometers is part of a more broad and complete ionospheric research project in Antarctica proposed by the INPE (Instituto de Pesquisas Espaciais) team. A description of such a project, showing its importance in the study of the auroral and subauroral regions and their coupling with the ionosphere of the equatorial latitudes, is also presented. (Auth.)

K-46628

Turtelli, A., Jr., **Studies of cosmic ray sources at high latitudes** [Estudos de fontes de raios cósmicos a grandes latitudes], Ciências atmosféricas e espaciais na Antártica. Anais do I Seminário Sobre Ciências Atmosféricas e Espaciais do Programa Antártico Brasileiro. (Atmospheric and space sciences in Antarctica. First Seminar on Atmospheric and Space Sciences of the Brazilian Antarctic Program, São José dos Campos, Apr. 27-29, 1988. Proceedings.) Edited by E.B. Pereira and V.W.J.H. Kirchhoff, Brazil, Instituto de Pesquisas Espaciais, 1989, p.231-243, In Portuguese with English summary. 3 refs.

Since Dec. 1986 a small telescope has been working at the Comandante Ferraz Station to measure anisotropy of cosmic radiation in the energy region beyond 100 TeV. A preliminary analysis of the first results is presented here. (Auth.)

K-46640

Mendes da Costa, A., Rizzo Piazza, L., **Diurnal lower ionosphere electron density variations observed in the South Atlantic Geomagnetic Anomaly and sub-Antarctic region during the occurrence of the major PCA event of 4 August 1972,** *Journal of atmospheric and terrestrial physics,* Jul./Aug. 1992 54(7/8), p.903-913, 43 refs.

VLF phase and amplitude signals simultaneously received in Atibaia and Curitiba, both in Brazil, were analyzed during the occurrence of the major proton flare event of Aug. 4, 1972. Phase advances recorded in Stockholm, Sweden and Inubo, Japan were also included for comparison purposes. Particular attention was devoted to the NWC (Australia)-Atibaia (Brazil) propagation path which passes through disturbed regions (geomagnetically), namely the subantarctic region and the South Atlantic Geomagnetic Anomaly (SAGA), and which propagates completely in the Southern Hemisphere. Following the current mechanisms that allow charged particles to precipitate at low altitudes in the ionosphere (D-region), four regions were defined, based on the most significant 'L' value involved. By means of successive comparisons with low- and mid-latitude propagation paths, some parameters typical of the lower ionosphere were deduced for the Southern Hemisphere in association with PCA events detected in the polar caps. By fitting exponential models to the data analyzed, daytime electron density profiles were obtained for different 'L' values throughout the disturbed period. (Auth.)

K-46642

Constable, C., **Link between geomagnetic reversal paths and secular variation of the field over the past 5 Myr,** *Nature,* July 16, 1992 358(6383), p.230-233, 25 refs.

Palaeomagnetic records provide information about the behavior of the geomagnetic field during reversals. Existing records are incompatible with transitional field configurations that are either entirely dipolar or entirely zonal. Recent compilations have indicated that the transitional paths of virtual geomagnetic poles (VGPs) for the past few reversals are located preferentially within two antipodal longitudinal bands, suggesting that simple but non-zonal field configurations dominate during reversals. It is pointed out that one of the longitudinal bands coincides with that expected from the reversal of a non-axial-dipole field exactly like that present today; the other requires only a sign change in the non-axial-dipole terms of today's field. Evidence for persistent non-zonal contributions to the field has generally (but not always) been regarded as not statistically significant in the light of poor data distributions. It is shown here that a non-zonal bias, similar to that observed in reversal data, is evident in data on secular variation of the field over the past 5 Myr, even after normalization according to site locations. These results suggest that the time-averaged field does indeed contain persistent (but not constant) non-zonal contributions. (Auth.)

K-46674

Burns, G.B., **Dynamics of the conjugate post-noon regions during an auroral enhancement,** *Journal of geomagnetism and geoelectricity,* 1992 44(2), p.65-90, 33 refs.

The morphological development of an event in the conjugate post-noon auroral ovals over a period of an hour is presented. A Viking UV camera imaged the northern dayside oval with a temporal resolution of 60 or 80 s while an active auroral form was observed by all-sky and keogram cameras to move through the zenith at South Pole Station. Early in the event a general similarity of form and development is observed between the hemispheres, but implying that the Northern Hemisphere forms are located on the order of four degrees of latitude higher, and on the order of one hour of MLT later, than IGRF calculated conjugate locations. Later in the event conjugacy is more difficult to establish. Short-lived features in the Southern Hemisphere photographs for which no Northern Hemisphere conjugate can be found imply that local acceleration processes may be important in this time sector. (Auth.)

K-46675
Ono, T., Hirasawa, T., **Apparent lifetime of auroral 630.0 nm (OI) emissions,** *Journal of geomagnetism and geoelectricity,* 1992 44(2), p.91-108, 28 refs.

An apparent lifetime of the auroral red line (630.0 nm OI) emission was investigated by using monochromatic auroral TV images obtained on July 18, 1984, at Showa Station. An evaluation of mean energy of the incoming electrons was made by using the temporal variation of the red line intensity. The observed red line intensity is compared with a synthesized variation of the auroral red line, solving differential equations for chemical reactions in the auroral ionosphere as well as the deactivation of excited state oxygen atoms. The observational results showed that the red line intensity changed gradually, keeping an apparent lifetime of about 35-40 sec, while the green line intensity changed step-wise. The lifetime found is significantly smaller than the value (about 110 sec) previously used for the interpretation of 630.0 nm (OI) auroral emission. The comparison showed that the observed apparent lifetime is consistent with a synthesized aurora excited by low energy electrons with a characteristic energy of 0.2-0.5 keV. (Auth.)

K-46689
Conde, M., Greet, P., Jacka, F., **Ring effect in the sodium D2 Fraunhofer line of day skylight over Mawson, Antarctica,** *Journal of geophysical research,* July 20, 1992 97(D11), p.11,561-11,565, 20 refs.

A dual scanning Fabry-Perot spectrometer at Mawson was used to obtain simultaneous direct solar and daytime sky spectra of the sodium D2 Fraunhofer absorption line at lambda = 589 nm. The intensity of the Ring component of skylight was determined from these spectra. These observations indicated that the absolute intensity of this component varied diurnally, maximizing at local noon. Observations over ice and snow gave greater absolute Ring intensities than those over open water. Fractional Ring intensities were typically 6% of the adjacent day sky continuum. During full daylight, no significant variation in fractional Ring intensity was observed with changing solar zenith angle; sharp increases were observed during twilight. These observations are consistent with the thesis that inelastic molecular scattering in the atmosphere is the cause of the Ring effect. (Auth. mod.)

K-46747
Kato, K., Tonegawa, Y., Sato, N., **Estimation of geomagnetic conjugate points by using Pc5 pulsations,** *Antarctic record,* Mar. 1992 36(1), p.1-14, In Japanese with English summary. 17 refs.

An attempt to estimate geomagnetic conjugate points by the method of Tonegawa and Sato using Pc5 geomagnetic pulsation data obtained simultaneously at 3 stations in Iceland and three stations in Antarctica, during Mar. and May of 1988, is reported. It is assumed in the estimation that Pc5 pulsations are odd mode standing oscillations of the field line and have linear phase variations among the stations in the horizontal plane. Results show that conjugate points of Showa Station estimated from Pc5 events are concentrated around the point calculated from the magnetic field model of Tsyganenko, within the range of +/- 3 deg in longitude, *i.e.,* less than 1/5 wavelength, and +/- 0.5 deg in latitude. (Auth.)

K-46761
Mayr, H.G., Harris, I., Dube, M., **Polar thermospheric Joule heating, and redistribution of recombination energy in the upper mesosphere,** *Journal of atmospheric and terrestrial physics,* Feb. 1990 52(2), p.103-112, 64 refs.

W.W. Kellogg suggested in 1961 that transport of atomic oxygen from the summer into the winter hemisphere and subsequent release of energy by three-body recombination, O+O+N2 to O2+N2+E, may contribute significantly to the so-called mesopause temperature anomaly (increase in temperature from summer to winter). In the auroral region of the thermosphere there is a steady energy dissipation by Joule heating, causing a redistribution and depletion of atomic oxygen due to wind-induced diffusion. With the removal of O, latent chemical energy normally released by three- body recombination is also removed, and the result is that the temperature decreases by almost 2% near 90 km. Through dynamic feedback, this process reduces the depletion of atomic oxygen by about 25% and the temperature perturbation in the exosphere from 10% to 7% at polar latitudes. Under the influence of the internal dynamo interaction, the prevailing zonal circulation in the upper thermosphere changes direction when the redistribution of recombination energy is considered. The above described effects are very sensitive to the adopted rates of eddy diffusion. They are also strongly time dependent and are significantly reduced for disturbances associated with magnetic storms. The data presented here have equal application to the polar regions of both hemispheres. (Auth. mod.)

K-46797
Candidi, M., Adriani, A., Agnelli, G., Viterbini, M., **All-sky camera project for the Italian antarctic base,** Italian Research on Antarctic Atmosphere, Conference proceedings, Vol.20, Bologna, Italian Physical Society, 1989, p.223-232, 6 refs.

The configuration of the Earth's magnetosphere and its dynamic modifications leading to the formation of optical auroras are described. The rationale for the installation of an optical all-sky camera at the Terra Nova Bay Station, based on the station's position in geomagnetic coordinates, is discussed. A description of the proposed instrumentation is given, and the parameters of the camera are analyzed with respect to the expected characteristics of auroral displays. (Auth. mod.)

K-46810
Mendes da Costa, A., Rizzo Piazza, L., ***D*-region electron density diurnal changes observed in association with the PCA event of July 1974,** *Journal of atmospheric and terrestrial physics,* Sep. 1992 54(9), p.1169-1175, 25 refs.

Well-defined diurnal phase and amplitude deviations of very low frequency radio signal propagation were detected during the solar proton event that occurred from July 3- 8, 1974. Phase advances observed on signals transmitted from GBR (U.K.), received at Atibaia (Brazil) and at Inubo Radio Observatory (Japan), were compared with simultaneous NWC (Australia) transmissions received at Atibaia, and at Showa Station (Antarctica). Emphasis was given to the propagation paths NWC-Atibaia and NWC-Showa, because both propagate completely in the Southern Hemisphere, crossing regions where the Earth's magnetic field behaves anomalously. The comparison allowed the determination of parameters typical of the *D*- region at a given height in the lower ionosphere, for geomagnetic regions defined through the McIlwain parameter (L). An exponential model was adopted to fit the vertical distribution of the diurnal electron density. The experimental results showed a delayed contribution to the total ionization observed, which was attributed to a slow precipitation of energetic particles in the South Atlantic Geomagnetic Anomaly region. (Auth.)

K-46894
Zhao, X.Z., **Influences of solar flare bursts and particle precipitations on the polar lower ionosphere,** *Antarctic research (Chinese edition),* Mar. 1992 4(1), p.36-41, In Chinese with English summary. 5 refs.

The influence of solar flare bursts and particle precipitation on the lower ionosphere has been observed by means of VLF propagation effects at Zhongshan Station. Sixty solar flare bursts were observed in one month, of which the largest one caused a decrease of 8.7 km in the lower ionospheric effective reflecting height. The HF telecommunication between particle precipitation events was observed 58 hours after the flare burst; a decrease of 3.5 km in the lower ionospheric effective height was noted. (Auth.)

K-46895

Yang, S.F., **Comparison of geomagnetic micropulsations at the Great Wall Station, Antarctica, and Beijing,** *Antarctic research (Chinese edition),* Mar. 1992 4(1), p.42-50, In Chinese with English summary. 7 refs.

A comparison of geomagnetic micropulsations observed in Antarctica and Beijing was carried out during the first Chinese expedition to Antarctica. Data analysis shows that during the geomagnetic quiet days, quiet pulsation activity is dominant in both areas, that Pc1/Pc4-5 pulsations occur sometimes in Antarctica and Pc3 pulsations in Beijing, and that Pi pulsations seldom occur. However, during geomagnetically disturbed days, Pi pulsations increase in both areas and they have a good corresponding relation, but those in Antarctica are stronger than those in Beijing. (Auth.)

K-46952

Cotton, P.D., Smith, A.J., **Signature of burst particle precipitation on VLF signals propagating in the antarctic Earth-ionosphere waveguide,** *Journal of geophysical research,* Nov. 1, 1991 96(A11), p.19,375-19,387, 40 refs.

The burst precipitation of energetic electrons (>40 keV), induced by interactions with lightning-generated whistler mode waves, has been observed to cause phase and amplitude perturbations on subionospheric VLF signals ("Trimpi" events). With a knowledge of the propagation characteristics of the subionospheric signal, analysis of the perturbation details can lead to estimates of the energy, extent, and location of the precipitation. Trimpi events have been observed on VLF signals propagating at high latitudes (L>4) over Antarctica, on 3.79 kHz signals transmitted from the horizontal dipole at Siple Station. A mode theory computer model for propagation of VLF waves in the antarctic earth-ionosphere waveguide is used to illustrate the characteristics of 3.79 kHz signals as they propagate from Siple toward VLF receivers at Halley and Amundsen-Scott stations. To simulate the effects of precipitation, localized depressions in the ionospheric reflection height are introduced over the great circle propagation paths in the model, and it is seen that, while the amplitude and phase perturbations of some specific events are accurately reproduced, large positive amplitude (up to 6 dB) Trimpi events at Halley cannot be reproduced. Calculations are presented which show that signals echoing from precipitation patches located away from the great circle path could be the cause of such signatures. (Auth.)

K-46976

Carpenter, D.L., **Case study of plasma structure in the dusk sector associated with enhanced magnetospheric convection,** *Journal of geophysical research,* Feb. 1, 1992 97(A2), p.1157-1166, 46 refs.

In a case study from June 8-9, 1982, data from ground whistler stations Siple and Halley located at L about 4.3 and spaced by about 2 hours in MLT, and from satellites DE1 and GEOS 2, have provided confirming evidence that the bulge region of the magnetosphere can exhibit an abrupt westward "edge," as reported earlier from whistlers. The present data and previous MHD modeling work suggest that this distinctive feature develops during periods of steady or declining substorm activity, when dense plasma previously carried sunward under the influence of enhanced convection activity begins to rotate with the Earth at angular velocities that decrease with increasing L value and becomes spirallike in form. (Auth. mod.)

K-47117

Meinhold, P.R., **Anisotropy measurements of the Cosmic Background Radiation at 3 mm wavelength and an angular scale of 30 arcminutes,** Berkeley, University of California, 1990, 109p., University Microfilms order No. 91-26703, Ph.D. thesis. Refs. p.107-109.

This dissertation is concerned with measurements of the anisotropy in the Cosmic Background Radiation (CBR)at 3 mm wavelength, on angular scales from 5 arcminutes to 1 degree. Measurements of the galactic plane show unexpectedly high emission at 3 mm, inconsistent with the previously accepted single component galactic dust model with a scaling index of 2. These measurements were carried out with a 1 m off-axis telescope designed for operation from a stratospheric helium filled balloon, but also used on the ground from the South Pole. The development of the instrument is described, and details of the optical system, detector, and servo system are given. Discussions of the performance of the various subsystems, along with the limitations of the instrument, are included. Two balloon flights and an expedition to the South Pole are described, and the data from the South Pole expedition are discussed in detail. The method used to produce upper limits to CBR fluctuations is explained, and the relevance of these limits to current theories of structure formation is discussed. A brief outline of ongoing and future work is given. (Auth. mod.)

K-47176

Yamagishi, H., ed, NIPR Symposium on Upper Atmosphere Physics, 14th, Tokyo, Jan. 22-23, 1991, **Proceedings of the NIPR Symposium on Upper Atmosphere Physics, No.5,** Tokyo, National Institute of Polar Research, 1992, 80p., Refs. passim. For selected papers see K-47177 through K-47179.

This volume contains 10 selected scientific papers among 69 individual contributions presented at the 14th Symposium on Coordinated Observations of the Ionosphere and the Magnetosphere in the Polar Regions, held at the National Institute of Polar Research on Jan. 22-23, 1991. One full-length paper and two extended abstracts are pertinent to Antarctica and deal with the following: instruments for atmospheric chemistry and radio astronomy, data collection from Showa Station for space weather forecasting, and polar cap AE indices.

K-47177

Ochiai, S., **Antarctic radio telescope for atmospheric chemistry and radio astronomy,** NIPR Symposium on Upper Atmospheric Physics, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1992, p.1-9, 6 refs.

Antarctica is an extremely suitable site for ground-based submillimeter wave remote sensing and radio astronomy. In particular, the very low water vapor concentration in the antarctic atmosphere is advantageous in millimeter and submillimeter wave observations of the upper atmosphere and astronomical objects. A radio telescope with an antenna of 60 cm aperture diameter with low noise superconducting receivers covering the frequency range from 200 to 280 GHz will be installed in Antarctica for atmospheric chemistry and astronomy uses. Chlorine monoxide and hydroperoxyl, which are concerned with ozone chemistry, and observations of the Milky Way of the Southern Hemisphere, and Magellanic Clouds at 230 GHz of carbon monoxide emission line, will be carried out. The telescope is now under development at the Communications Research Laboratory in collaboration with the University of Tokyo. The millimeter wave observation will start in 1994 at Showa Station. (Auth. mod.)

K-47178

Tokumaru, M., **Near-realtime data collection from Syowa Station and its utilization for space weather forecast (Extended abstract),** NIPR Symposium on Upper Atmospheric Physics, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1992, p.26-30, 7 refs.

Acquisition and transfer systems of observational data at Showa Station using an INMARSAT link have been developed. With this system, near-real time data from Antarctica become available in Japan. To apply these data to space weather forecast, the *J*-index is introduced for a real time evaluation of geomagnetic activities, which showed a good correlation with the *K*-indices.

K-47179

Saroso, S., **Derivation of polar cap AE indices,** NIPR Symposium on Upper Atmospheric Physics, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1992, p.35-45, 15 refs.

The authors have derived, on a test basis, a geomagnetic index by using presently available data in the southern polar cap; observatories used are located at Scott Base and Dumont d'Urville, Vostok and Mirnyy Stations. To derive disturbance fields, a base value of each station for each month is first calculated using a moving average method, and this base value is subtracted from hourly data from the station in that month. Then, after a coordinate conversion, the largest and smallest values are selected from the 4 stations in the same way as the AU and AL indices are derived. The results of the variation of the disturbance fields from the 4 stations show a clear diurnal and seasonal variation depending on distribution of the stations and the ionospheric conductivities in the southern polar cap. The highest correlation is found between the polar cap AE indices and the AE, AU, and AL indices in the local winter; the correlation decreases in the local summer due to the increases of the ionospheric conductivity in the polar cap caused by solar UV radiation. (Auth. mod.)

K-47201

Barr, R., **Simple theoretical model of the diffraction of VLF electromagnetic waves by the antarctic icecap,** *Journal of atmospheric and terrestrial physics,* Nov./Dec. 1992 54(11/12), p.1527-1533, 19 refs.

The antarctic continent has been modelled as a spherical cap whose pole is coincident with that of the South Pole, which totally absorbs VLF radio waves attempting to propagate over it. The propagation of Omega navigation signals around this model icecap has then been computed using the Kirchhoff diffraction theory. Spherical caps extending to 66.5 and 75.5S have been found to accurately model the signals from Omega La Reunion and Argentina, respectively, received on flights between Christchurch, New Zealand and Scott Base in Antarctica, up to the boundary of the theoretical icecap. These model icecaps were found to be good fits to the boundary of the antarctic continent, when measured at the 1-1.5 km contour of ice thickness, in the region where the VLF waves diffracted around the icecap. The good agreement obtained between the experimental field strength data and those computed theoretically, using only simple diffraction theory, suggests that coastal refraction plays at most only a secondary role in circumpolar propagation. (Auth.)

K-47210

Morris, R.J., Cole, K.D., **High-latitude day-time Pc1-2 continuous magnetic pulsations: a ground signature of the polar cusp and cleft projection,** *Planetary and space science,* Nov. 1991 39(11), p.1473-1491, 33 refs.

New observational and dynamical morphological results of high-latitude Pc1-2 (0.2-10 s) magnetic pulsations observed at Davis, Antarctica during solar maximum are presented. An interesting regime of Pc1-2 containing structured, semi-structured and unstructured long duration (1-10 h) magnetic pulsation bands (2-10 s), which appear to maximize in occurrence frequency and amplitude under the projection of the dayside polar cusp/cleft, is examined. An account of these emissions is given, including periods, amplitudes, duration, diurnal and seasonal distributions, polarization, power spectra and their association with magnetic activity. Moreover, a review of the literature reveals the necessity for a universal convention to clear up the apparent paradox and confused nomenclature existing in the literature on high-latitude Pc1-2 magnetic pulsations. This study concludes that Pc1-2 magnetic pulsations as reported provide a ground diagnostic estimate as to whether a station lies under the projection of the polar cusp/cleft. (Auth.)

K-47211

Hansen, H.J., **High latitude unstructured Pc1 emissions generated in the vicinity of the dayside auroral oval,** *Planetary and space science,* May 1991 39(5), p.709-719, 31 refs.

Three months of ground-based recordings of high latitude dayside Pc1 magnetic variations at auroral oval stations Showa and Mawson are compared. Dynamic spectra reveal that banded unstructured Pc1 emissions (0.2-0.4 Hz) may be separated into pre-noon and post-noon activity. Although the pre-noon activity is common at Mawson, its observation at Showa is associated with low altitude cleft-like ions being present at lower than normal latitudes, i.e. 75 deg MLAT. These ions are determined from DMSP satellite observations. The Pc1 emissions at both stations are interpreted as arising from ion cyclotron waves generated in the equatorial plasmatrough region. The authors regard the dayside cleft as the free energy source of the pre-noon Pc1 activity by supplying the equatorial magnetosphere with ions. It is believed that the ion cyclotron waves enter the ionosphere within the auroral oval, poleward of Mawson and Showa, and fast Alfvén mode waves, which then arise, propagate to the stations in the F2-region ionospheric waveguide. (Auth.)

K-47264

Cotton, P.D., **Propagation of mixed polarization VLF *(f* 5 (or less) kHz) radio waves in the antarctic earth-ionosphere waveguide,** *Radio science,* Sep.-Oct. 1992 27(5), p.593-610, 35 refs.

During 1986, a series of special VLF transmissions at 3 kHz and 5 kHz was made from the crossed dipole antenna at Siple Station which simulated transmissions from a single horizontal dipole at a number of different orientations. The signals excited broadside to the dipole were seen to exhibit characteristics notably different from those of signals excited along the axis of the antenna, showing a minimum in received power (the depth of the minimum decreasing for the more highly attenuating paths) and increases in apparent arrival azimuth error and elevation angle. A simple computer model for mode propagation close to 5 kHz in the Antarctic Earth-ionosphere waveguide showed that these variations were the consequence of two effects: the preferential excitation of quasi-transverse magnetic (QTM) modes along the axis of the antenna, and the lower attenuation of quasi-transverse electric (QTE) modes (with respect to QTM modes) over the antarctic ice sheet. These results have important implications for studies involving the subionospheric propagation of signals with frequencies at the lower end of the VLF band and over highly attenuating surfaces, showing that QTE modes play a significant and sometimes dominant role. (Auth. mod.)

K-47301

Hayakawa, M., Shimakura, S., Kobayashi, T., Sato, N., **Study of polarization of irregular pulsations of diminishing period and their generation mechanism,** *Planetary and space science,* Aug. 1992 40(8), p.1081-1091, 30 refs.

The polarization of irregular pulsations of diminishing period (IPDPs) observed in Iceland $(L=6\text{-}7)$ and at Showa Station was investigated and some new findings have emerged: the IPDP event which has so far been considered to be one single event, normally consists of a few subelements (or slopes); and, in general, the first major element occupying the lowest frequency range is left-handed circularly polarized and the second major element in the higher frequency range is right-handed polarized. A hypothesis is presented to account for these observational facts. The first fact is indicative of the nature of successive particle injections during a substorm. The protons with higher energy during the first injection seem to encounter the bulge of the plasmasphere or plasmatail in the local time (L.T.) sector of 15-18 h and at $L=6\text{-}8$, which would result in the generation of ion cyclotron waves. Then, if one supposes that protons with lower energy are injected during a subsequent burst, they meet the plasmapause body at $L<5$ and at L.T.$>$18 h and, due to the ionospheric duct propagation over the great distance between the generation region and observing stations, the polarization in Iceland would be right-handed, which is consistent with observations. (Auth. mod.)

K-47338
Ono, T., Satake, R., Yoshino, T., Hirasawa, T., **Energy parameters of the incident auroral electrons derived by the intensity ratio of auroral emissions,** *Antarctic record,* July 1992 36(2), p.163-180, In Japanese with English summary. 21 refs.

Average energy and total energy flux of the incident electrons in active auroras are estimated by using the intensity ratio of auroral emissions measured with a multi- channel photometer at Showa Station in 1990. Measured intensity ratios were directly compared with a result of model calculation of auroral emissions. The estimated energy parameters in active auroras showed a rapid change of average energy as well as total energy flux of electrons associated with pulsating auroras and intense auroral arcs. Average energy and total energy flux of the auroral electrons determined by the present method were consistent with the result of the previous *in situ* observations of precipitating electrons. Data analyses of active arcs in break-up phase showed that usage of the 427.8 nm emission has difficulty due to a scattering effect of the atmosphere. Usage of 670.7 nm emission in place of 427.8 nm made it possible to evaluate the energy parameters of electrons even in the vicinity of intense auroral arcs. (Auth. mod.)

K-47339
Yukimatu, A., **Characteristics of 30-MHz interference noises observed by riometers,** *Antarctic record,* July 1992 36(2), p.181-202, In Japanese with English summary. 8 refs.

In 1989, when the sun was highly active, interference noise was often observed by 30 MHz riometers at Asuka and Showa stations. The noise showed a systematic diurnal and seasonal variation, and was global phenomenon because it was also seen in other riometer data at high and middle latitudes in the Northern Hemisphere. This noise was investigated in connection with ionospheric *foF2* data, geomagnetic *Kp* indices and sunspot numbers. The results are summarized as follows: interference noise consists mainly of ground radio waves reflected by the ionosphere; the interference noise occurrence shows a good correlation with *foF2;* and the noise intensity shows a tendency of decreasing on weekends, and this feature suggests that the noise is mainly of artificial origins. It is concluded that the occurrence feature of the interference noise reflects the condition of the ionosphere, and can be used as an indicator of the global electromagnetic wave environment in the HF range. (Auth.)

K-47341
Yamagishi, H., **Development of imaging riometers,** *Antarctic record,* July 1992 36(2), p.227-250, In Japanese with English summary. 12 refs.

An 8 by 8 beam imaging riometer with a view field of 180 km by 180 km, spatial resolution of 20 km, and time resolution of 1 to 4 s developed in Japan is discussed. The system design is described with emphasis on the difference from the first imaging riometer system, IRIS. This system has a unique capability of displaying absorption image on a real-time basis with the aid of QL software. The performance of the array antenna system is confirmed by simulation calculations using the galactic radio noise map at 30 MHz obtained by Cane. Procedures for absorption image forming are also described. Some of the absorption images obtained by this system are compared with optical auroral images observed at the same location at the same time. It is found that both images show a good similarity for morning-side auroras. It is concluded that the imaging riometer is a very useful tool for monitoring the auroral form when optical aurora observation is difficult. (Auth. mod.)

K-47342
Sato, M., Yamagishi, H., Kato, Y., Nishino, M., **Quick-look system of auroral absorption images by imaging riometer,** *Antarctic record,* July 1992 36(2), p.251-267, In Japanese with English summary. 6 refs.

The imaging riometer of two-dimensional multi-narrow beams is a powerful radio instrument to investigate the structure of cosmic noise absorption (CNA) in the auroral ionosphere caused by the precipitation of energetic electrons. However, the instrument has the drawback of delayed-look for imaging because of the use of a large-capacity computer for data processing. A quick-look (QL) system of the imaging riometer was developed by using a personal computer. This system is able to view the CNA images in real time. Quiet day curves (QDCs) which indicate the condition of quiet ionosphere are determined from daily variations of cosmic noise intensity obtained during the initial ten days. Thereafter the QDCs are set into real-time data processing as a reference. The QL system has an advantage for real-time comparison with auroral images by the all-sky TV camera. (Auth.)

K-47346
Yukimatu, A., **Observation of the upper atmosphere physics at Asuka Station by the 30th Japanese Antarctic Research Expedition in 1989,** *Antarctic record,* July 1992 36(2), p.294-309, In Japanese with English summary. 4 refs.

The JARE-30 activities at Asuka Station included year-round cosmic noise absorption measurements with a 30-MHz riometer; installation of fixed direction and tracking photometers and observation of spatial and temporal development of auroral photoemissions at various wavelengths; re-installation of an all-sky camera used during JARE-28; the installation of an all-sky SIT-TV camera for observation of auroral motions with high time resolution; installation of a digital auroral photometric-data recorder; and the recovery of the Z-component of a malfunctioning ULF induction magnetometer, allowing for observation of the 3 components of both the fluxgate and the induction magnetometers. Interesting geophysical events and auroral phenomena, due to high solar activity in 1989, are reported.

K-47375
Kimura, I., Matsuo, T., Tsuda, M., Yamauchi, K., **Three dimensional ray tracing of whistler mode waves in a non-dipolar magnetosphere,** *Journal of geomagnetism and geoelectricity,* 1985 37(10), p.945-956, 8 refs.

A three dimensional ray tracing technique for whistler mode signals in the earth magnetosphere using a non-dipolar geomagnetic field model is investigated. A difficulty arising from the adoption of a general field model in ray tracing is that field line tracing is additionally required at every step of the calculation. This is because the plasma density profile such as the diffusive equilibrium model are defined along a geomagnetic field line which cannot be analytically determined in the general field model. To substantially reduce the computer time, a minimum number of field line tracings are made in advance, and in the course of ray tracing some interpolation is utilized. The error arising from such interpolations is found to be insignificant. Some examples of ray tracing are shown. The ray path of 5 kHz signals starting from the bottom of the ionosphere of the Siple (64.9S, 7.5W in geomagnetic coordinates) meridian is found to deviate eastward by about 15 deg at the apex. (Auth.)

See also:
B-47139 E-45157 E-45212 E-45213 F-45683 F-45684 F-45685
F-46400 G-45815 I-45228 I-45664 I-45679 I-46724 L-45806
L-45880

L. TERRESTRIAL PHYSICS

L-45116
Skvarca, P., Cerrato, A.A., **Accurate gravity air-link between South America and the Antarctic Peninsula,** Actas de la Primera Conferencia Latinoamericana sobre Geofísica, Geodesia e Investigación Espacial Antárticas. (First Latin American Conference on Antarctic Geophysics, Geodesy and Space Research, Buenos Aires, July 30-Aug. 3, 1990. Proceedings.) Edited by A. Louro, M.A. Van Zele, and I. Velasco, [Buenos Aires, Centro Latinoamericano de Física, 1990], p.25-33, 12 refs.

In the winter of 1979, three two-way closed loops were measured with two LaCoste & Romberg geodetic gravimeters between Rio Gallegos, Argentina and Seymour I. The aim of this project was to establish an accurate gravity base station of known absolute gravity on the northern tip of the Antarctic Peninsula, required for the regional land gravity surveys carried out as part of the IAA geophysical field program, and to link with the highest possible accuracy the existing and future Antarctic Peninsula gravimetric network with the International Gravity Standardization Net 1971 (IGSN 71) via South America, due to its proximity. Discussion of the gravity measurements, calibration aspects and data reduction describes how this was accomplished.

L-45119
Vila, J., Ortiz, R., **Seismic activity on Deception Island** [Actividad sísmica en Decepción], Actas de la Primera Conferencia Latinoamericana sobre Geofísica, Geodesia e Investigación Espacial Antárticas. (First Latin American Conference on Antarctic Geophysics, Geodesy and Space Research, Buenos Aires, July 30-Aug. 3, 1990. Proceedings.) Edited by A. Louro, M.A. Van Zele, and I. Velasco, [Buenos Aires, Centro Latinoamericano de Física, 1990], p.51-61, In Spanish. 13 refs.

Continuous investigations of the seismic activity on Deception I., carried out through a seismic network installed by the Spanish antarctic expedition in 1986 and expanded over the years, are discussed. Records of numerous events of 1-2.1 magnitude are presented. Three types of volcanic tremors were determined; their location and characteristics are described.

L-45120
Garcia, A., Catalan, M., Rey, J., Vila, J., Viramonte, J.G., **Magnetic anomalies on Deception I. and their integration in the study of Bransfield Strait** [Anomalías magnéticas en Deceptión y su integración en el estudio del Mar de la Flota], Actas de la Primera Conferencia Latinoamericana sobre Geofísica, Geodesia e Investigación Espacial Antárticas. (First Latin American Conference on Antarctic Geophysics, Geodesy and Space Research, Buenos Aires, July 30-Aug. 3, 1990. Proceedings.) Edited by A. Louro, M.A. Van Zele, and I. Velasco, [Buenos Aires, Centro Latinoamericano de Física, 1990], p.62-71, In Spanish. Refs. p.66-67.

A magnetic survey carried out in the inner bay of Deception I. revealed the existence of a NW-SE structure with an extensive area of negative anomaly (>3000 nT), associated with a linear intrusion of high temperature material, and responsible for the latest eruptions. It is suggested that these findings are incompatible with the theory that the bay originated from the collapse of the Deception I. caldera.

L-45123
Valladares, J., Ghidella, M.E., LaBrecque, J.L., Brunetti, M., **Comparison between the total geomagnetic field reference values and those measured in the Drake Passage** [Comparación del campo magnético total entre valores de referencia y medidos en el pasaje de Drake], Actas de la Primera Conferencia Latinoamericana sobre Geofísica, Geodesia e Investigación Espacial Antárticas. (First Latin American Conference on Antarctic Geophysics, Geodesy and Space Research, Buenos Aires, July 30-Aug. 3, 1990. Proceedings.) Edited by A. Louro, M.A. Van Zele, and I. Velasco, [Buenos Aires, Centro Latinoamericano de Física, 1990], p.91-98, In Spanish. 5 refs.

The USAC aerosurvey program, a joint effort by the U.S., Argentina and Chile which has been in operation since Nov. 1985, is described. The information given includes number of flights (10-20/y), altitude (above 6,500 m), area covered (mostly the Drake Passage), and the program's object: to determine the geologic history of the area. Early in the program a significant difference was detected between the geomagnetic field values of international reference and the values measured during each flight. The process of selecting and analyzing the data needed to evaluate this difference, for an area between Tierra del Fuego and the Antarctic Peninsula, is described. It is concluded that, due to the difference discussed in this study, careful use of global models in the studied area is advisable.

L-45143
Gianibelli, J.C., Suarez, E.K., **Characteristics of secular variations for epoch 1969.5 in antarctic and subantarctic regions** [Caracteristicas de la variacion secular para la epoca 1969.5 en las regiones antártica y subantártica], Actas de la Primera Conferencia Latinoamericana sobre Geofísica, Geodesia e Investigación Espacial Antárticas. (First Latin American Conference on Antarctic Geophysics, Geodesy and Space Research, Buenos Aires, July 30-Aug. 3, 1990. Proceedings.) Edited by A. Louro, M.A. Van Zele, and I. Velasco, [Buenos Aires, Centro Latinoamericano de Física, 1990], p.312-322, In Spanish. 11 refs.

Secular variations were determined of the components X, Y and Z of the geomagnetic field between the South Pole and latitude 43 deg 13'S, for the epochs 1965.5, 1969.5 and 1973.5. The aim was to study the anomalies of the secular variations and to establish the location of the isoporic foci related to the geomagnetic pulse which occurred in 1969.5. Results show that the component Z permits one to determine clearly the anomalous regions of the secular variation linked to the pulsation processes of the geomagnetic field.

L-45147
Guterch, A., Grad, M., Janik, T., Perchuć, E., **Deep crustal structure in the region of the Antarctic Peninsula from seismic refraction modelling (next step of data discussion),** *Polish polar research,* 1990 11(3-4), p.215-239, 12 refs.

Seismic measurements, including multichannel seismic reflection and deep seismic soundings, were carried out in the region of the west coast of the Antarctic Peninsula in 1979/80, 1984/85 and 1987/88. Selected crustal sections and one and two- dimensional models of the crust for this area are discussed in detail. The thickness of the crust ranges from 30-33 km in the South Shetland Is. to 38-45 km near the coast of the Antarctic Peninsula. The crustal structure beneath the trough of Bransfield Strait is highly anomalous; a seismic discontinuity with velocities of 7.0-7.2 km/s was found at a depth of 10 to 15 km, and a second discontinuity with velocity of about 7.6 km/s was found at a depth of 20-25 km. A seismic inhomogeneity along the Deception-Penguin-Bridgeman volcanic line has also been found. A scheme for the geotectonic division and a geodynamical model of the area are discussed. Based on all experimental seismic data, it will be possible to construct a continuous geotraverse from Elephant I. across Bransfield Strait up to Adelaide I. with a total length of about 1100 km. Crustal section and seismic models along the northern segment of the geotraverse from King George I. to the Palmer Archipelago are discussed in detail. (Auth. mod.)

L-45167

Larter, R.D., Barker, P.F., **Effects of ridge crest-trench interaction on Antarctic-Phoenix spreading: forces on a young subducting plate,** *Journal of geophysical research,* Nov. 10, 1991 96(B12), p.19,583-19,607, Refs. p.19,605-19,607.

Precise measurements of spreading rates on marine magnetic profiles collected to the west of the Antarctic Peninsula have enabled some consideration of the forces governing plate motion, since Antarctic-Phoenix motion has been controlled by the local rather than global force balance over the last 35 m.y. The different driving forces acting on the NE and SW parts of the Phoenix plate, as a consequence of older oceanic lithosphere at the trench in the NE, caused Antarctic—Phoenix spreading to take place about a near pole to the SW since 21 m.y. ago, and ultimately resulted in disruption of the Phoenix plate about 9 m.y. ago. Spreading rates decreased abruptly about 6 m.y. ago, probably because of E-W compression across the long transform faults bounding the Phoenix plate. However, spreading on the last three segments of the Antarctic-Phoenix Ridge continued at least until 4 m.y. ago. Either spreading stopped progressively from SW to NE, or the final stage took place about a very near pole to the SW. A magnetic quiet zone extends up to 95 km from the margin between the Tula Fracture Zone and the North Anvers Fracture Zone, and is thought to indicate that the ridge crest became buried by terrigenous sediment prior to collision. The absence of a magnetic quiet zone associated with the most recent ridge crest-trench collisions suggests a change in sedimentary regime during the late Miocene. Anomalously fast apparent spreading rates between 23 and 21 m.y. ago are thought to indicate an error in this part of the magnetic reversal time scale. (Auth. mod.)

L-45168

Anderson, H.J., Zhang, J.J., **Long-period seismic radiation from the May 23, 1989 Macquarie Ridge earthquake: evidence for coseismic slip in the mantle?,** *Journal of geophysical research,* Nov. 10, 1991 96(B12), p.19,853-19,863, 44 refs.

Long-period seismic source parameters of the May 23, 1989 Macquarie Ridge earthquake are determined using a surface wave inversion procedure that incorporates detailed source-time functions obtained from shorter-period body waves. The seismic source model obtained using this method is consistent with observations of both body waves and long-period Rayleigh waves from the earthquake. The Macquarie Ridge earthquake rupture has a centroid time (28 s) and a right-lateral strike-slip fault mechanism with a rake of 175 deg on a vertical fault plane striking N38E. This mechanism is consistent with *P* wave first motions of the event. Inversions performed for various earth models demonstrate that the choice of surface wave attenuation model, in particular, affects the estimates of centroid depth and seismic moment significantly. The centroid depth, combined with the lack of resolvable directivity of the earthquake rupture, suggests that significant slip occurred beneath the Moho, which has a maximum depth of about 16 km in the epicentral region. The mantle slip component may have preferentially radiated long-period seismic energy, given the shallow centroid depths and low moments determined for the event from the shorter-period body wave observations. (Auth. mod.)

L-45253

Grushinskiĭ, N.P., Stroev, P.A., Grushinskiĭ, A.N., IAtsenko, E.V., **Earth crust and effective topography of Antarctica** [Zemnaia kora i effektivnyĭ rel'ef Antarktidy], Gravimetricheskie i magnitnye issledovaniia na more (Gravity and magnetic investigations at sea). Edited by P.A. Stroev and A.G. Rodnikov, Moscow, MGKP AN SSSR, 1989, p.163-168, In Russian. 11 refs.

The correlation between earth crust thickness and Bouguer gravity anomalies for Antarctica are calculated by using deep seismic sounding and gravity data. A map of earth crust thickness is compiled. The effective heights of the continent are calculated and a map of effective topography is compiled. The term "effective height" means the height of the continent surface, assuming that the ice cover is condensed to the average density of the earth crust. (Auth. mod.)

L-45323

Kaminuma, K., **Seismicity in Antarctica and local earthquake activities around Syowa Station, East Antarctica,** *Korean journal of polar research,* June 1991 2(1) (Special issue), Second International Symposium on Antarctic Science, Seoul, Korea, Sep. 17-18, 1990. [Proceedings], p.87-96, 19 refs.

A tripartite seismic array was established at Showa Station in 1987 for studying the local seismicity. Nine micro-earthquakes were recorded by the array during 19 months, from June 1987 to Dec. 1988, which were located in the coastal area of the antarctic continent and offshore. There are many well-developed elevated beaches and marine terraces in the coastal ice-free area of the antarctic continent. These have been formed by the relative lowering of sea level, caused by crustal uplift after deglaciation. The local micro-earthquakes seem to have been caused by tectonic stress which was accumulated by the slow-moving crustal uplift. (Auth. mod.)

L-45469

Liu, C., **Paleomagnetism of the Late Cretaceous and Early Tertiary rocks from Fildes Peninsula, West Antarctica and its geotectonic significance,** *Antarctic research (Chinese edition),* 1991 3(2), p.136-143, In Chinese with English summary. 14 refs.

The paleomagnetism of 109 drill cores, collected from 5 rock units of Late Cretaceous and Early Tertiary on Fildes Peninsula, was studied. It is found that the paleomagnetic pole position of Antarctica was not at the same position as that of Australia during the 55-45 Ma period. This is interpreted as meaning that Australia was separated from Gondwanaland at its breakup during the above period, drifting southward 20-30 deg and rotating 70-80 deg westward, until it gradually arrived to its present position. It is suggested that paleolatitudinal data indicate that the area studied was covered by land glaciers at that time. The apparent polar wanderings of Antarctica through geological time are roughly worked out. (Auth. mod.)

L-45706

Bozzo, E., **Magnetic reconnaissance of central Victoria Land between the Transantarctic Mountains and Terra Nova Bay, from ground surveys (1986-88),** *Società Geologica Italiana, Rome. Memorie,* 1988 Vol.43, Meeting on Earth Science in Antarctica, Siena, Sep. 27-28, 1988. Proceedings, p.165-171, With Italian summary. 11 refs.

Within the frame of the geophysical investigation of central Victoria Land, between the Transantarctic Mountains and Terra Nova Bay, a ground geomagnetic survey was performed in cooperation with other data acquisition programs of the Earth Science group. Some results of this survey, related to the compilation of the geomagnetic field maps, are presented here with a description of the main outcropping lithological units, made on the basis of the rock magnetic susceptibility data collected during the survey. A qualitative interpretation of the geomagnetic results from a geostructural standpoint is made along a transect which in a SSW-NNE direction crosses the area investigated during the first three Italian expeditions in Antarctica. (Auth.)

L-45708
Berger, P., **Acquisition, processing and preliminary results of the Antarctic 1987-88 geophysical survey,** *Società Geologica Italiana, Rome. Memorie,* 1988 Vol.43, Meeting on Earth Science in Antarctica, Siena, Sep. 27-28, 1988. Proceedings, p.181-205, With Italian summary. 21 refs.

During the summer of 1987-88, a geophysical survey (seismic, gravity and magnetic) was carried out in the Ross Sea on board the research vessel *O.G.S. Explora.* Six lines of total length 2323 km, one of which was deep survey, were recorded. The first survey began on Jan. 26, 1988, when the *O.G.S. Explora* sailed from the harbor of Ushuaia, and ended on Mar. 8, 1988, with its arrival in Wellington harbor. Gravimetric and geomagnetic data were continuously acquired during the cruise. The multichannel seismic survey was carried out in the Ross Sea from Feb. 10 to 24. The acquisition parameters are described and, in the light of onboard quality control and the results of processing of the data, suggestions for future surveys are made. (Auth.)

L-45800
Damaske, D., **Regional anomalies from aeromagnetic survey in Victoria Land,** *Società Geologica Italiana, Rome. Memorie,* 1991 Vol.46, Meeting on Earth Science Investigations in Antarctica, Siena, Oct. 4-6, 1989. Proceedings, p.527-532, With Italian summary. 8 refs.

In 1984/85 an aeromagnetic survey was carried out over parts of northern Victoria Land and the western Ross Sea. In the Ross Sea area the Victoria basin shows a distinct magnetic character strongly supporting a graben-type structure within a continental crust. To the north, an abrupt change in the magnetic pattern is marked by large circular anomalies. These are connected to a magnetic unit around an elongated anomaly of large positive amplitude. This unit extends westward across the coast into the Transantarctic Mountains, possibly joining the Rennick Graben zone. Further west over the Polar Plateau the survey displays features typical for shield areas. In a second survey in 1988/89 the Rennick Graben zone itself and the border of the East Antarctica shield (or platform) in the vicinity of the lower Rennick Glacier was the main target. The results require that the shield border must be looked for west of 158E. (Auth. mod.)

L-45801
Lanza, R., Manzoni, M., Miletto, M., **Paleomagnetic data from the Mt. Melbourne volcanic province, north Victoria Land, Antarctica,** *Società Geologica Italiana, Rome. Memorie,* 1991 Vol.46, Meeting on Earth Science Investigations in Antarctica, Siena, Oct. 4-6, 1989. Proceedings, p.533-541, With Italian summary. 25 refs.

The Cenozoic volcanites of the Mt. Melbourne volcanic province have been sampled at 23 sites for paleomagnetic studies during the 1985-86 Italian expedition to northern Victoria Land. After demagnetization, statistically significant TRM directions have been obtained for 21 sites, whose VGPs are scattered about a paleopole latitudinally displaced with respect to the geographic pole. A chronologic subdivision of the volcanites can be proposed on the basis of their magnetic polarities: the Mt. Melbourne cone was formed during the Brunhes Epoch of normal polarity; the southern basal part of Mt. Melbourne and a few minor satellite bodies, plugs and dykes were formed during the Matuyama Epoch of reverse polarity; the basal part of the ridge SE of Mt. Melbourne to Cape Washington belongs to the Gauss Epoch of normal polarity; the volcanites of the northernmost area, at the Burnes-Tinker Gls. confluence, having been dated at 10-12 Ma, belong to an event of reverse polarity within the anomalies 5 and 5A. (Auth. mod.)

L-45802
Brancolini, G., Gantar, C., Lodolo, E., Marchetti, A., **Acquisition, processing and preliminary results of the 1988/89 antarctic geophysical survey,** *Società Geologica Italiana, Rome. Memorie,* 1991 Vol.46, Meeting on Earth Science Investigations in Antarctica, Siena, Oct. 4-6, 1989. Proceedings, p.543-560, With Italian summary. 19 refs.

During the summer of 1988-89, a second multichannel seismic reflection, gravity and magnetic survey was performed by Osservatorio Geofisico Sperimentale of Trieste, in the southwestern part of the Pacific Ocean and the Ross Sea on board the research vessel *Explora.* Gravity and magnetic data were recorded throughout the cruise; 21 sonobuoys were dropped to record refraction seismic data. Instrumentation and acquisition parameters are described as well as processing tests and sequence, with particular reference to the multiple attenuation problem. A preliminary interpretation of some structural elements from seismic data is given. (Auth. mod.)

L-45804
Morelli, A., Romeo, G., Meloni, A., Palangio, P., **Permanent unmanned very-broad band seismic station in Terra Nova Bay: installation, tests and perspectives,** *Società Geologica Italiana, Rome. Memorie,* 1991 Vol.46, Meeting on Earth Science Investigations in Antarctica, Siena, Oct. 4-6, 1989. Proceedings, p.575-583, With Italian summary. 17 refs.

During the summer of 1988-89, an advanced seismic station (international code TNV) was installed and tested close to the Terra Nova Bay Italian base. The sensors comply with the very-broad band (VBB) specifications, with an instrument response flat on ground velocity in the frequency band from 8 Hz to 3 mHz, and the digitizers allow a dynamic range of 140 dB. For such a sensitive instrumentation, the installation was made inside an 8 m granite tunnel. The seismograph was kept running for a test period of about one month. Data analysis revealed a rather low background noise level, which was expected to decrease significantly after the slow mechanical settling of the sensors. A large event located in the Molucca Is. was recorded and studied. Beginning with the austral summer 1990-91 the station is expected to start continuous unmanned operation. (Auth. mod.)

L-45805
Azzara, R., **Geomagnetic measurements at the Terra Nova Bay (Antarctica) Italian magnetic observatory during the austral summers 1986/1987, 1987/1988 and 1988/1989,** *Società Geologica Italiana, Rome. Memorie,* 1991 Vol.46, Meeting on Earth Science Investigations in Antarctica, Siena, Oct. 4-6, 1989. Proceedings, p.585-594, With Italian summary. 11 refs.

A magnetic observatory has been installed in Terra Nova Bay with the following objects: to provide a database for the reduction of magnetic survey measurements; to measure the elements of the magnetic field in order to provide absolute values and the secular variation trend for the base area; to obtain data to investigate the time variations of the geomagnetic field; and to supply values to World Data Centers for the definition of the IGRF. All data for the 3 austral summers have been reduced, and results are shown together with a discussion of time variations. (Auth. mod.)

L-45806
Gubellini, A., Postpischl, D., **Mount Melbourne (Antarctica) geodetic network,** *Società Geologica Italiana, Rome. Memorie,* 1991 Vol.46, Meeting on Earth Science Investigations in Antarctica, Siena, Oct. 4-6, 1989. Proceedings, p.595-610, With Italian summary. Refs. p.608-610.

Activities carried out during the 1988-1989 Italian Antarctic Expedition, concerning principally the design, monumentation and a survey of a GPS network for the study of deformations in the Mt. Melbourne area, are reviewed. Following a description of the criteria used for the station selection and monumentation, the results obtained on the summit of Mt. Melbourne are presented, highlighting the problems related to the use of the GPS technique at high latitudes. The results of a study for the estimation of the ellipsoid-geoid deviation in the geodetic station of Terra Nova Bay are also presented. (Auth. mod.)

L-45865
Fütterer, D.K., ed, Schrems, O., ed, **Expedition ANTARKTIS-VIII of RV *Polarstern* 1989/90: Reports of Legs ANT-VIII/6-7** [Die Expedition ANTARKTIS-VIII mit FS *Polarstern* 1989/90: Bericht von den Fahrtabschnitten ANT=VIII/6-7], *Berichte zur Polarforschung,* 1991 No.90, 231p., In German with English summary.

During the sixth leg of ANT-VIII expedition the RV *Polarstern* operated between the Greenwich Meridian and 40E along the antarctic continental of Lazarev Sea, Riiser Larsen Sea and Cosmonaut Sea. A predominantly geoscientific coring and profiling program devoted to the oceanic plateaus of Gunnerus Ridge, Astrid Ridge and Queen Maud Rise was carried out. The main geophysical targets were (1) investigation of the crustal structure of the plateaus and their differences, and (2) investigation of the variation in character of the Mesozoic oceanic crust and its age. The main but still preliminary geophysical results are: (1) the oldest identified sea-floor spreading anomaly in the Riiser Larsen Sea had been anomaly M11 before the cruise; now it is M24. Thus spreading has begun at least 160 mill. years ago. (2) The Gunnerus Ridge is strongly asymmetric. The mainly weak magnetic anomalies indicate that volcanism was not an important process during its formation, which is in contrast to the formation of the Astrid Ridge. (3) The magnetic anomalies are much stronger on the Astrid Ridge and west of it than east of the Astrid Ridge and on the Gunnerus Ridge. (4) The roughness of the basement surface of the oceanic crust varies over a wide range. Leg 7 of this cruise took *Polarstern* on a biogeochemical survey of the waters of the upper South Atlantic and North Atlantic during the journey from Capetown to Bremerhaven. (Auth. mod.)

L-45880
Fujii, R., **Magnetic field survey with the aid of polar patrol balloons in Antarctica,** *Nihon gakushiin. Proceedings of the Japan Academy. Series B,* Mar. 1991 67(3), p.17-21, 7 refs.

A polar patrol balloon (PPB) has accomplished a complete circumpolar flight over the Antarctic. The total intensity of the geomagnetic main field measured by an onboard magnetometer shows a satisfactory agreement with that calculated from the IGRF-model. A coincidence of the actual PPB trajectory with that calculated from wind data indicates that wind flow with the synoptic scale has little variability in the summer stratosphere in Antarctica. The novel PPB systems open new fields for the detailed observation of polar phenomena at balloon altitudes. (Auth.)

L-45883
Cook, D., Davy, B., Wood, R., **Data coverage of the New Zealand and antarctic geophysical database,** *DSIR. Geophysics division. Technical report,* Aug. 1989 No.100, 50 leaves, 3 refs.

An extensive collection of digital geophysical data from the New Zealand and Ross Dependency regions is held by Geophysics Division, D.S.I.R. These data include free air and Bouguer gravity anomalies, magnetic total force anomalies and bathymetry. Marine seismic reflection and refraction data and interpretations are also stored. The limits of data coverage are 24S to 58S and 157E to 167W for the New Zealand region, and 68S to 80S and 160E to 150W for the Ross Dependency region. Figures show the data coverage for each geophysical data type. At the time of writing there were more than one million records in the Marine Database, including about 137,000 aeromagnetic and 35,000 land gravity measurements. Updates to the database occur as new data are collected. The preponderance of data at mid-1989 is in the New Zealand sector, at a ratio of about 6:1. (Auth. mod.)

L-45886
Tessensohn, F., **LIRA: lithographic investigations in the Ross Sea area: a proposal for a multinational coordinated regional research programme,** New Zealand Geological Survey Report G151, Lower Hutt, NZ, DSIR Geology and Geophysics, 1991, p.61-66.

SCAR, the Scientific Committee on Antarctic Research, has established a Group of Specialists to develop international initiatives "towards acquiring the data needed for understanding the structure and evolution of the antarctic lithosphere." Under the name of ANTALITH, this group of specialists has initiated a first international geoscientific program in a central corridor across West Antarctica and into East Antarctica. The LIRA program is meant to be a complementary program under the same initiative. It concerns the area of the Ross Sea embayment and its flanks where geoscientific problems are similar to those of ANTALITH but can be treated more easily because of better infrastructure and much better access. The proposal concerns primarily the four nations with bases in this region, i.e, USA, New Zealand, Fed. Republic of Germany and Italy. LIRA is not meant to be a large funding program but rather a coordination program of the relevant national activities in this area with maximum use of existing logistic capabilities. The two main functions of LIRA are to provide a forum for the exchange of scientific ideas, plans and research results, and to promote the coordination of programs, joint ventures and sharing of logistics wherever possible. (Auth.)

L-45892
Weber, W., **Structure and development of the antarctic Earth's crust,** *Gerlands Beiträge zur Geophysik,* 1990 99(6), p.513-522, With German summary. 20 refs.

The antarctic Earth's crust consists of the Precambrian East Antarctic craton and the mobile West Antarctic block field. This block field can be divided into a Proterozoic- early Paleozoic region at the proto-Pacific margin of the East Antarctic craton and a Palaeozoic/-Meso-/Caenozoic active Pacific mobile belt. The main tectogenetic events of the antarctic crustal development coincide with those of the other southern continents. A scheme of the geological development of the main structural units is presented. (Auth.)

L-46084
Kim, Y., Chung, T.W., Nam, S.H., **Marine magnetic anomalies in Bransfield Strait, Antarctica,** *Korean journal of polar research,* Dec. 1991 2(2), p.101-116, In Korean with English summary. Refs. p.114-116.

A marine magnetic survey was carried out to study the crustal structure of Bransfield Strait during the 1990/1991 summer season.

Total magnetic intensities of 8 profiles with lengths of 40-70 km across the Strait were recorded. The total survey length was about 400 km. Diurnal magnetic variation was removed from the data using the observations made on King George I. during the period, and total intensity anomalies were calculated by subtracting the IGRF (1985 coefficients). The positive anomalies commonly shown in the profiles were interpreted to be caused by two kinds of igneous bodies: a magnetic basement deduced as plutons of the Andean Intrusive Suite, and the basaltic dykes along the ridge axis. The anomalies by the basaltic dykes range from 200-2000 nT. The various shapes of the dykes are suggested from two-dimensional modeling. The dyke model suggests that the amount of extension varies. It is suggested that this regional variation of extension is possibly due to the westward migration of compressive stress: because of the small scale spreading compared to that of the ocean floor, the irregular pattern of spreading in the back arc basin may have been caused by a small change of stress field of plate motion. The mechanism of irregular spreading also can be explained by a diffusion model. (Auth. mod.)

L-46086

McAdoo, D.C., Marks, K.M., **Gravity fields of the southern ocean from Geosat data,** *Journal of geophysical research,* Mar. 10, 1992 97(B3), p.3247-3260, 34 refs.

In Aug. 1990 the U.S. Navy declassified all Geodetic Mission (GM) radar altimeter data acquired by the Geosat satellite over oceanic regions south of 60S. These GM data were used in conjunction with the unclassified lower-resolution Geosat Exact Repeat Mission (ERM) altimeter data to construct high-resolution gravity fields on a 5 km grid covering the annular region of the southern ocean, which lies between 60S and 72S and encircles Antarctica. During the GM a complete mapping of the marine geoid (between 72S and 72N) was accomplished. The GM produced more densely spaced ground tracks (typically 2 or 3 km at 60S) than those of either the ERM or Seasat. The GM data were used to map the marine gravity field at a higher resolution than was previously possible using satellite altimeter data. This paper describes the techniques used to derive these gravity fields and image them. (Auth. mod.)

L-46180

Kaminuma, K., Nagasaka, K., **Seismological bulletin of Syowa Station, Antarctica, 1990,** *Japanese Antarctic Research Expedition. JARE data reports,* Feb. 1992 No.172, 106p., 3 refs.

The observation system at Showa Station is shown in a schematic diagram; the frequency response of the seismometers and epicenter locations of seismic events detected at Showa Station are shown in graphs and charts; read-out data and a list of the 181 earthquakes detected are given in tables; and the appendix contains reproductions of seismic records.

L-46192

Kaminuma, K., Akamatsu, J., **Intermittent micro-seismic activities around Syowa Station, East Antarctica,** NIPR Symposium on Antarctic Geosciences, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1991, p.1-10, 13 refs.

A tripartite seismic array was established at Showa Station in 1987 for studying the local seismicity; 10 micro-earthquakes were recorded from June 1987 to Jan. 1989. These earthquakes are located in the geological and geophysical structural boundaries of the coastal area on the antarctic continent and offshore. Four earthquakes were recorded from Feb. to Oct. 1989. The local earthquakes around Showa Station occurred intermittently. There are many well-developed elevated beaches and marine terraces in the coastal ice-free area of the antarctic continent. These have been formed by the relative lowering of sea level, caused by the crustal uplift after the deglaciation. The local micro-earthquakes seem to have been caused by the tectonic stress which had accumulated by the slow-moving crustal uplift. As local earthquakes occur intermittently, it seems that the crustal uplift is not a linear movement but an intermittent one, and the local earthquakes occur corresponding with the intermittent crustal uplift. (Auth. mod.)

L-46193

Nogi, Y., Seama, N., Isezaki, N., Funaki, M., **Magnetic survey on Ongul Island, East Antarctica,** NIPR Symposium on Antarctic Geosciences, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1991, p.11-19, 15 refs.

During the 30th Japanese Antarctic Research Expedition in 1989, geomagnetic field measurements were carried out along 2 east-west observation lines on Ongul I., and 2 east-west and 3 north-south observation lines on East Ongul I. The variations of magnetic anomalies on Ongul I. seem to correlate with the surface geology, while those on East Ongul I. do not. A model calculation showed a positive correlation of the obtained variations on Ongul I. with the geological structure and paleomagnetic results. However, widths and positions of the magnetic anomaly source model are slightly different from those of the surface geological structure. These differences provide information on how the surface geological structure extends underground. (Auth. Mod.)

L-46195

Shibuya, K., **Planned explosion seismic experiments in east Queen Maud Land using a penetrator,** NIPR Symposium on Antarctic Geosciences, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1991, p.29-38, 16 refs.

In order to compare crustal velocity structures of east Queen Maud Land with those of Enderby Land, large explosion seismic experiments are planned along 24E for a 400 km profile, from Breid Bay through Asuka Station and toward the Nansen Ice Field. An expendable seismograph deployable from a helicopter (antarctic penetrator) is being developed to install 40-50 seismic stations, with an elevation range from 0 to 3000 m in a limited operational schedule. The penetrator must have memories to store the digital seismic records. The recorded data have to be transmitted by radio telemetry to the central data acquisition system on the helicopter. This report briefly summarizes scientific objectives of the planned explosion experiments, and the status of the development of the antarctic penetrator. (Auth. mod.)

L-46196

Asakawa, S., Kaminuma, K., Shimizu, H., **Seismic activity of Mount Erebus, Antarctica in 1989,** NIPR Symposium on Antarctic Geosciences, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1991, p.39-45, 9 refs.

The annual mean number of earthquakes per day, counted at the summit station E1 of Mount Erebus, was 47 in 1989. This value indicates that the low seismic activity after the 1984 volcanic event still continued into 1989, and that it can be divided into two phases; Jan.-Aug. and Sep.-Dec. The average daily count of earthquakes for the former phase was 61, and that for the latter, 15. The hypocenters of only 12 earthquakes were determined in 1989 by using the *P* arrival time readings at 5 stations. The distribution of earthquakes in 1989 is similar to that in previous years (after the 1984 volcanic event). The average daily number of earthquakes in 1988 was 15, and the surface of the lava lake of Mount Erebus solidified in Dec. 1988. The average daily number of earthquakes in 1989 was 47, and the surface of the lava lake melted again in Dec. 1989. The seismic activity of Mount Erebus in 1989 was slightly higher than that in 1988. (Auth. mod.)

L-46197
Takanami, T., Kitagawa, G., **Extraction of microearthquake signals recorded by the seismic network on Mt. Erebus, Ross Island, Antarctica,** NIPR Symposium on Antarctic Geosciences, Proceedings. No.5, Tokyo, National Institute of Polar Research, 1991, p.46-52, 11 refs.

A methodology is introduced for the extraction of information from observed microearthquake waves. A model is shown for decomposition of time series into several components. In the model each component is expressed by an autoregressive model. The extraction of microearthquake signals from noise data and the decomposition of *P* and *S* wave signals are shown as an example of the adequacy of the proposed procedure. Seismic noise data recorded by the seismic network installed on the summit of Mt. Erebus is used in the procedure described. (Auth. mod.)

L-46343
Bentley, C.R., **Configuration and structure of the subglacial crust,** Geology of Antarctica. Edited by R.J. Tingey, Oxford, Clarendon Press, 1991, p.335-364, Refs. p.358-364.

On the premise that the most important characteristic of the subglacial antarctic crust is the fundamental difference between East and West Antarctica, an analysis is made of the differences regarding subglacial topography, seismic refraction measurements, surface waves, body waves, and gravity. Also found of particular interest is the boundary zone between East and West Antarctica; the work carried out in this region, and other regions of interest, is reviewed. It is noted that East Antarctica is truly continental, whereas West Antarctica is some kind of borderland, the geological nature of which is being vigorously debated; that the mean thickness of its crust is about 30 km, compared with about 40 km in East Antarctica; and that the boundary between the two Antarcticas is abrupt, which is interpreted as indicating that the change in crustal thickness is also sudden.

L-46461
Anderson, D.L., Tanimoto, T., Zhang, Y., **Plate tectonics and hotspots: the third dimension,** *Science,* June 19,1992 256(5064), p.1645-1651, Numerous refs.

High-resolution seismic tomographic models of the upper mantle provide powerful new constraints on theories of plate tectonics and hotspots. Midocean ridges have extremely low seismic velocities to a depth of 100 km. These low velocities imply partial melting. At greater depths, low-velocity and high-velocity anomalies record, respectively, previous positions of migrating ridges and trenches. Extensional, rifting, and hotspot regions have deep (>200 km) low-velocity anomalies. The upper mantle is characterized by vast domains of high temperature rather than small regions surrounding hotspots; the asthenosphere is not homogeneous or isothermal. Extensive magmatism requires a combination of hot upper mantle and suitable lithospheric conditions. High-velocity regions of the upper 200 km of the mantle correlate with Archean cratons. The range of this global study extends to 60S for most parameters, and to the antarctic coast for some. (Auth. mod.)

L-46643
Das, S., **Reactivation of an oceanic fracture by the Macquarie Ridge earthquake of 1989,** *Nature,* May 14, 1992 357(6374), p.150-153, 15 refs.

Theoretical calculations show that the occurrence of an earthquake leads to regions of increased shear stress on both sides of the ruptured fault. If this stress increase is sufficiently large, or if neighboring faults are close to their failure stress, the result may be triggering of earthquakes on pre-existing faults in the region. A search for this effect produced only a few examples, all in continental areas, where clusters of aftershocks were located in the regions of increased stress. The linear dimensions of these clusters were generally less than 20 km, and less than one-half of the fault length that ruptured in the main shock. An example of this phenomenon is reported here in which the fault that is reactivated is a nearly 175 km-long segment of an oceanic fracture, and its length is comparable to that of the main shock, the 1989 Macquarie Ridge earthquake. (Auth. mod.)

L-46743
Nagasaka, K., Kaminuma, K., Shibuya, K., **Seismological observations by a three-component broadband digital seismograph at Syowa Station, Antarctica,** *Antarctic record,* Nov. 1991 35(3), p.335-354, In Japanese with English summary. 6 refs.

A three-component broadband STS (Streckeisen seismometer) seismograph was installed at Showa Station in 1989, to obtain a precise (digital) seismic record for the study of the earth's interior and earthquakes. The STS observation system at Showa Station is introduced and some examples of digital seismogram are shown. The STS system has two different outputs, BRB (Broad-Band: 0.1-20 s/0.1-360 S) and LP (Long-Period: longer than 20 s), with a dynamic range of at least 120 dB. Seismic signals are recorded in digital form together with analog seismograms for monitoring. The BRB output is currently recorded with a long-term thermal pen recorder and the digital recording system by use of personal computers, while the LP output is recorded with a pen recorder and cassette logger. Well recorded events are compiled into floppy disks from the digital recording system approximately once a week. The digital records were transmitted successfully to the National Institute of Polar Research, Japan, via the satellite telecommunications system. (Auth.)

L-46768
Zipfel, J., Wörner, G., **Four- and five-phase peridotites from a continental rift system: evidence for upper mantle uplift and cooling at the Ross Sea margin (Antarctica),** *Contributions to mineralogy and petrology,* 1992 111(1), p.24-36, 44 refs.

Based on petrographical and geothermobarometric results and diffusion arguments, a four stage model is developed for the evolution of the upper mantle beneath the margin of the Ross Rift: (1) adiabatic uplift into the plagioclase/spinel-peridotite field; (2) subsequent cooling below the blocking temperature (800 C) of the 2 px-thermometer to about 600 C as indicated by low Ca in olivine cores; followed by (3) reheating to 760 C as suggested by zonation to high calcium concentrations of up to 200 ppm in olivine rims. Calcium concentrations of up to 800 ppm were measured in one ELZ-olivine in the outermost rim (10 micron) reflecting (4) a last heating event during transport and ascent in the basanitic host magma. Timing for the latter two stages has been roughly calculated from Ca-diffusivities in olivine. A minimum duration of 1200 to a few million years is indicated for stage 3 and 90 h to 22-23 days for stage 4, respectively. This timing of events correlates to increased mantle temperatures for the duration of magmatic activity of the Mt. Melbourne Volcanic Field and the short-term transport in host magmas. The results also indicate that anomalous shallow mantle exists at the transition from the Ross Rift into the uplifted Transantarctic Mountains. (Auth.)

L-46893
Liu, J.H., **Note on the crustal structure between the Antarctic Peninsula and the East Antarctic Craton across the shelf of the southern Weddell Sea,** *Antarctic research (Chinese edition),* Mar. 1992 4(1), p.23-28, In Chinese with English summary. 13 refs.

On the basis of analysis of gravity data across the shelf between the Antarctic Peninsula and the East Antarctic Craton, constrained by magnetic depth estimates and seismic refraction data, this paper deals with the crustal structure of the southern Weddell Sea and its evolution. The water depth along the cross-section varies from 400 m to 600 m with no abrupt changes, except in the southeast where the water is nearly 1000 m deep. A geophysical survey indicated that there is a large sedimentary basin under the Ronne-Filchner Ice Shelf, the depocenter being in the middle of the basin with a maximum sediment thickness of 10 km. In Airy-type isostatic equilibrium, a possible 2-D model for the crustal structure under the shelf of the southern Weddell Sea is proposed. A particular feature of the model is the requirement for a thinned crust below the sedimentary basin. The younger part of the sedimentary section does not display significant evidence of extensional tectonics. It is suggested that extension of the crust must therefore have occurred at an early stage of basin evolution, or the upper part of the sedimentary section is very young. (Auth. mod.)

L-46943
Acosta, J., **Magnetic anomalies in southern Bransfield Strait** [Anomalías magnéticas al sur del mar de Bransfield], Actas del tercer Symposium Español de Estudios Antárticos. Gredos, 3 al 5 de octubre de 1989. (Spanish Symposium on Antarctic Studies, 3rd, Gredos, Oct. 3-5, 1989. Proceedings), [Madrid], Comisión Interministerial de Ciencia y Tecnología, [1990], p.254-257, In Spanish with English summary.

During the 1987-1988 and 1988-1989 antarctic expeditions, two digital magnetometers were installed on the South Shetland Is. The one on Livingston I. has three components: protons, F, and flux gate D and I; the one on Deception I. consists of protons recording total force (F). Both instruments were used in the summer seasons in magnetic surveys of the area. Results on land and magnetic profiles obtained at sea are discussed and illustrated.

L-46945
Acosta, J., Catalan, M., Herranz, P., Sanz, J.L., **Seismic profiles of the South Shetland Islands and the Bransfield Strait. Recent structure and dynamics** [Perfiles sísmicos en las Shetland del Sur y estrecho de Bransfield. Estructura y dinamica reciente], Actas del tercer Symposium Español de Estudios Antárticos. Gredos, 3 al 5 de octubre de 1989. (Spanish Symposium on Antarctic Studies, 3rd, Gredos, Oct. 3-5, 1989. Proceedings), [Madrid], Comisión Interministerial de Ciencia y Tecnología, [1990], p.281-296, In Spanish with English summary. 20 refs.

Shallow seismic profiling and geomagnetic total field records were conducted in Bransfield Strait and the continental shelf of the South Shetland Is. during the Exantarte 88-89 expedition. The location of seismic profiles was partly determined by sea ice conditions. The seismic records were obtained by a 4 Kj sparker, and recorded on an EPC analog recorder simultaneously at 1 and 2 seconds scale, after filtration between 80 Hz and 600 Hz. Geomagnetic profiles were obtained with a marine proton magnetometer working simultaneously with sparker profiling. Seismic profiles show a ridge lineation following a Deception I.-Penguin I.-Bridgeman I. line, with outcrop mountains associated with high geomagnetic anomalies. In the Bransfield Strait central area, a sedimentary prism with normal faulting, sea floor scarps, offset seismic reflectors, sea floor morphology and intrusive volcanic bodies, indicate a recent seismically active faulting zone associated with a rifting area. (Auth. mod.)

L-47019
Sadovskiĭ, M.A., Avsiuk, IU.N., **Why is Antarctica aseismic,** *Akademiia nauk SSSR. Doklady. Earth science sections,* July 1992 314(1-6), p.54-58, 12 refs. For Russian original see 45-1859 or 19L-43506.

Data from seismic stations both in the interior and coast of Antarctica indicate that earthquake epicenters encircle the continent but do not occur within it, indicating that the continent is aseismic. In this paper an explanation of this paucity of seismic activity is proposed in terms of the hierarchical block structure of the antarctic continent. (Auth. mod.)

L-47330
Grad, M., Guterch, A., Sroda, P., **Upper crustal structure of Deception Island area, Bransfield Strait, West Antarctica,** *Antarctic science,* Dec. 1992 4(4), p.469-476, Refs. p.475-476.

Results of seismic refraction investigations of the upper crustal structure in the area of Deception I, carried out in 1979-1980 and 1987-1988, are discussed. In the caldera and immediate vicinity of Deception I. a layer of unconsolidated and poorly consolidated young sediments of 1.9-2.2 km/s P-wave velocity was found. Velocities of 4.1-4.3 km/s were found in the depth interval from 0.6-1.3 to about 3 km. Lateral differences in upper crustal structure between the southeastern and western sectors were identified. In the region between Deception and Livingston islands an inclined boundary with a velocity of about 6.1 km/s occurs. A deep fault zone dividing crustal blocks beneath Deception I. is associated with a prominent volcanic line within Bransfield Strait, extending between Deception and Bridgeman islands. (Auth. mod.)

L-47347
Shibuya, K., **Status report for the development of the antarctic penetrator: No.2. 1990-year program,** *Antarctic record,* July 1992 36(2), p.310-340, In Japanese with English summary. For program No.1 see 19L-44414 or 45-3397. 7 refs.

The Global Positioning System (GPS) differential positioning test on the antarctic penetrator was made at the Aoyama Pasture, Ishikari-Tobetsu-machi, Hokkaido. The reference GPS receiving site was chosen in Hakodate, 200 km southwest of the Aoyama Pasture, taking the seismic exploration experiments on the Sör Rondane Mountains 400 km profile in Antarctica into consideration. Three dummy penetrators were dropped twice by changing the release height in the range of 160-1000 m above the ground. Six impact positions of the deployed penetrators were determined by a relative carrier phase measurement to an accuracy of 0.1 m, and the position results were compared with the post-processed GPS differential positions. When 10-20 s duration GPS position data could be acquired at an interval of 1 s before and after the release time (1 s accuracy to UTC) of the penetrator, the estimated impact position by tracing the falling trajectory was found to be within 30 m offset from the actual impact location determined by the relative carrier phase measurement. (Auth. mod.)

L-47360
McAdoo, D.C., Marks, K.M., **Correction to "Gravity fields of the southern ocean from Geosat data",** *Journal of geophysical research,* Nov. 10, 1992 97(B12), p.17,709.

Referring to the record L-46086, corrections are given to typographical errors made in the original equations 3(a), 3(b), (p.3253) and 5 (p.3254), JGR 97(B3):3247-3260, 1992

L-47371
Weber, M., **Late Quaternary sedimentation at the continental margin of the southeastern Weddell Sea, Antarctica** [Spätquartäre Sedimentation am Kontinentalrand des südöstlichen Weddellmeeres, Antarktis], *Berichte zur Polarforschung,* 1992 No.109, 165p., In German with English summary. Refs. p.113-123.

During four Polarstern expeditions geological samples were retrieved on the continental margin in the southeastern Weddell Sea east of Crary Fan for sedimentological studies. High resolution seismic reflection data were also collected along 5.000 profile kilometer for interpretation. Detailed sedimentological analyses were carried out on 22 surface samples as well as on sediment cores from three sites. In addition to a general description of the sediments and structural investigations on X-radiographs, the contents of carbonate and organic carbon, the grain-size and component distribution, the distribution of minerals in the clay fraction and physical properties such as water content, porosity, wet bulk density, dry density and magnetic susceptibility were determined. The stratigraphy is based on C-14 dating, the distribution of stable oxygen and carbon isotopes in the planktonic foraminifera *Neogloboquadrina pachyderma,* and on paleomagnetic measurements. Details of the analyses, measurements, and time periods of these properties are given. (Auth. mod.)

See also:
A-46171 C-45885 C-46462 C-46572 C-47285 C-47370 E-45114
E-45117 E-45148 E-45266 E-45707 E-45745 E-46068 E-46083
E-46175 E-46191 E-46199 E-46200 E-46676 E-46716 E-46860
E-46977 E-46982 E-47142 E-47287 F-45122 F-45502 F-45978
F-46106 F-47332 F-47348 G-45451 I-45866 K-46761

M. POLITICAL GEOGRAPHY

M-45107

Herber, B.P., **International public goods of Antarctica: a new politico-economic regime for the world's seventh continent,** International Institute of Public Finance, 44th Congress, Istanbul, 1988. Proceedings, edited by V. Tanzi, Detroit, MI, Wayne State University Press, 1990, p.263-276, With French summary. 25 refs.

DLC HJ113.I73 1988

Recent decades have witnessed a growing scholarly interest in public goods. Much of this attention, however, has been directed toward collective consumption within sovereign national political jurisdictions. As a result, the concept of international public goods, in which collective consumption benefits are shared among sovereign nations, has generally been neglected. The purpose of the present paper is to draw further attention to international collective consumption by considering a particular international public goods case which, in itself, has been largely neglected by economists despite the importance which it portends for the world community. That case encompasses the international treaty which, since 1961, has provided the politico-economic framework for governing the world's seventh continent, Antarctica, and the unique international public goods which this treaty has generated. In Section II, some of the theoretical peculiarities generic to international public goods are identified. The Antarctic Treaty and its international public goods are then described in Section III. Changing treaty parameters pointing to the likelihood of a new governance regime, as well as major regime alternatives, are considered in Section IV. An assessement of the future of antarctic public goods is provided in Section V in relationship to the selection process for a new governance regime. (Auth.)

M-45151

Machowski, J., **Right to freedom of research under the Antarctic Treaty System,** *Polish polar research,* 1990 11(3-4), p.419-434, 35 refs.

Freedom of research is one of the fundamental principles upon which the Antarctic Treaty System (ATS) was founded. Its scope is defined by the limitations imposed by relevant legal rules. They provide, among others, for prohibition of scientific investigation of military character and declare that no activities—including research—shall constitute a basis for territorial claims in Antarctica. Of particular importance are limitations imposed on freedom of research for the benefit of environmental protection. But, contrary to some views, most scholars consider that the freedom of research and the protection of the environment and ecosystems in Antarctica are equally important principles central to the whole ATS. They are inter-dependent and neither one should be attributed priority over the other. In the best interests of science, antarctic research needs to be controlled to the necessary minimum of environmental impact and risk. (Auth.)

M-45160

Herber, B.P., **Common heritage principle: Antarctica and the developing nations,** *American journal of economics and sociology,* Oct. 1991 50(4), p.391-406, 33 refs.

An effort is underway to apply the common heritage principle to certain unique global resources while promoting economic development. Under this precept, property rights to such resources are said to belong to all nations and their citizens rather than being subject to national sovereignty. The doctrine is examined in theory and as applied in the outer space and law of the sea treaties. Its possible application to Antarctica is explored in relationship to the Antarctic Treaty System (ATS) which is now considering a minerals regime for the continent. Assessing the international political situation suggests the powerful bloc of ATS nations will ignore the common heritage principle. However, a different outcome is possible, given a convergence of the antarctic mining and global atmospheric issues of the greenhouse and ozone varieties. Under this scenario, the global atmosphere and Antarctica would be common property resources whose property rights are owned by all nations. (Auth.)

M-45190

Vallesi, A., **Legal regime of Antarctica in international law** [Il regime giuridico dell'Antartide nel diritto internazionale], *Il polo,* Sep. 1991 Vol.3, p.29-38, In Italian. 14 refs.

Negotiations for the incorporation of Article VII into the Antarctic Treaty to enforce its most important principle, the promotion of peaceful utilization of the Antarctic, are reviewed. A paragraph by paragraph analysis is made of the Article's provisions, which grant the right of free inspection of all regions and all stations to each of the signatory parties. The question of territorial revendication in the Antarctic is examined in the light of the Treaty's juridical discipline.

M-45301

Almond, H.H., Jr., **Antarctica and outer space: emerging perspectives and perceptions,** From Antarctica to outer space: life in isolation and confinement, edited by A.A. Harrison, Y.A. Clearwater and C.P. McKay, New York, Springer-Verlag, [1990], p.373-382.

DLC Q180.55.P75F76

It is pointed out that competition for territory and resources in previously uninhabited areas provides a basis for international friction and conflict. Some of the pitfalls and loopholes that exist in antarctic and space law are described, and ways in which international agreements and treaties in Antarctica can be improved and extended to regulate people and nations in outer space are discussed.

M-45302

Schwetje, F.K., **Justice in the Antarctic, space and the military,** From Antarctica to outer space: life in isolation and confinement, edited by A.A. Harrison, Y.A. Clearwater and C.P. McKay, New York, Springer-Verlag, [1990], p.383-394, 16 refs.

DLC Q180.55.P75F76

Some of the constraints that antarctic and space environments are likely to place upon the normal legal and judicial processes are reviewed. The Uniform Code of Military Justice is offered as a possible prototype for application in outer space.

M-46074

Caflisch, L., **Interaction of science and politics in the field of international relations: the case of Antarctica,** *Polar record,* Apr. 1992 28(165), p.159-162, 4 refs.

This paper is concerned with the interplay between science and politics when dealing with the formation and implementation of international rules of conduct for the Antarctic. After examining the behavior of the main political actors on the antarctic scene, i.e. the conduct of sovereign states and of international inter-governmental or non-governmental organizations, the author concludes that SCAR provides the indispensable communication link between science and politics in Antarctica.

M-46097
U.S. National Science Foundation, **Antarctic journal of the United States, Vol.26, No.4,** Washington, D.C., 1991, 23p.

Developing a comprehensive system to ensure the protection of the antarctic environment has been a focus of discussion among the Antarctic Treaty Consultative Parties (ATCP) during 2 years of special meetings. On Oct. 4, 1991, representatives of the 26 consultative parties concluded their negotiations and adopted by consensus the Protocol on Environmental Protection to the Antarctic Treaty. This pivotal agreement, which builds on the Antarctic Treaty and related agreements, extends and improves the effectiveness of the treaty system to preserve the antarctic environment. The protocol designates Antarctica as a natural reserve, devoted to peace and science. Besides prohibiting all mineral-resource activities (except those associated with scientific investigations), the protocol sets forth general principles, which apply to any human activity in Antarctica, to ensure the preservation of the continent's environment, as well as its dependent and associated ecosystems. Although the full text of the protocol and its annexes (but not the three appendixes) follow this article, some of its essential components are described here. Included among the essential components are: environmental principles and impact assessment; compliance with the protocol; committee for environmental protection; inspections and reporting; dispute settlement; conservation of fauna and flora; waste disposal and management at the stations and in the field; prevention of marine pollution; and area protection and management.

M-46139
Inderbitzen, A.L., **Convention on the regulation of antarctic mineral resource activities,** Pacific/Asia Offshore Mechanics Symposium, First, Seoul, Korea, June 24-28, 1990. Proceedings, Vol.1. Edited by J.S. Chung et al, Golden, CO, International Society of Offshore and Polar Engineers, 1990, p.39-43, 3 refs.

DLC TC1665.P34 1990

After six years of negotiation the Antarctic Treaty Consultative Parties reached agreement on a Convention for the Regulation of Antarctic Mineral Resource Activities. The agreement is not a code of detailed regulations, but rather a set of standards and criteria upon which decisions about possible future antarctic mineral resource activities must be based. Five institutions are established to administer the entire process. Activities must proceed in three distinct stages: prospecting, exploration and development. No activity can proceed beyond prospecting unless there is a unanimous decision by the Commission to open an area for exploration and possible development. Decisions for mineral resource activity cannot be made until there is adequate information to make informed judgements on the possible environmental impacts. No activity can take place unless the technology and procedures are available to meet the strict standards of the treaty; to monitor the impact of the activity; and to respond effectively to accidents. The agreement contains many restraints and controls on mineral resource activities. Any operation that poses an environmental threat can be shut down. Although the future of the agreement is uncertain it will be many years before there is any significant mineral resource activity in Antarctica, if ever. (Auth. mod.)

M-46141
Rigg, K., Hemmings, A., Mathias, M., **Protecting the antarctic environment by limiting human presence and activities: the case for a world park,** Pacific/Asia Offshore Mechanics Symposium, First, Seoul, Korea, June 24-28, 1990. Proceedings, Vol.1. Edited by J.S. Chung et al, Golden, CO, International Society of Offshore and Polar Engineers, 1990, p.51-58, 42 refs.

DLC TC1665.P34 1990

The refusal of several Antarctic Treaty Parties in 1989 to ratify the Convention on the Regulation of Antarctic Mineral Resources Activity (CRAMRA), which had been signed in June, 1988 by all Parties, emphasized the difficulty in attaining international consensus on regulation of mineral exploitation of the antarctic environment. This paper discusses a radical alternative to the assumption that such exploitation can be rendered consistent with fundamental environmental protection, by examining the proposition that Antarctica be converted to a World Park. This program would effectively prohibit all industrial activity on the antarctic continent, and would advance the protection of this vast ecosystem as the primary purpose of human presence in Antarctica.

M-46702
Moreano, H., **Ecuadorian national antarctic policy and mechanisms for its application** [La política nacional del Ecuador para asuntos antárticos y sus mecanismos de aplicación], *Acta antártica ecuatoriana,* 1990 Vol.1, p.87-90, In Spanish with English summary. 2 refs.

It is felt that the three Ecuadorian Antarctic Expeditions and the admission of Ecuador, by consensus, as a consultative Member of the Antarctic Treaty, are facts through which the country has made real its interest in Antarctica, and that future geopolitical and scientific activities should be directed to enhance the Ecuadorian presence in that continent, framed within a solid national policy. This paper establishes a concept of the national policy in antarctic matters within the context of the Antarctic Treaty System. Mechanisms to apply such a policy through the Ecuadorian Antarctic Program and the National Scientific Committee on Antarctic Research are considered. (Auth.)

M-46736
Berkman, P.A., Woyach, R.B., **International transitions in the Antarctic Treaty System,** *Polar record,* July 1992 28(166), p.244-245, 10 refs.

Since the Antarctic Treaty entered into force in 1961, the perception of potential resources has influenced the focus of the international community about the area south of 60S. This note demonstrates that, concurrent with increased marine living resource activities and speculation about mineral resources around Antarctica, there was a dramatic transition in the composition of the Antarctic Treaty System (ATS) during the mid-1970s.

M-46737
Scientific Committee on Antarctic Research, **SCAR bulletin No.106, July 1992,** *Polar record,* July 1992 28(166), p.255-259.

The meeting of the SCAR *ad hoc* Group on Antarctic Space-Related Human Factors Research took place 1-2 October 1991. An update on the status of the International Antarctic Microbiology Project is provided in reports which cover progress in advancing understanding of the population, genetic structure, and genotype of *Staph epidermidis* which is the most important member of the cogulose-negative staphylococcal group from the standpoint of virulence and its ability to cause disease in man. A major technological advance for improving the ability to index the bacterial genome is the development of pulsed-field electrophoresis. Summaries of ESA research are given on psychological problems arising from isolation in a hostile environment; dedicated space year; immunology; and telemedicine. NASA and NSF reports were heard on antarctic medical/psychological studies.

M-46754
Yoshida, Y., **Protocol on Environmental Protection to the Antarctic Treaty and its Annexes. International Agreement on the Comprehensive Measures for the Protection of Antarctic Environment and Ecosystems,** *Antarctic record,* Mar. 1992 36(1), p.116-161, In Japanese with English summary. 2 refs.

According to Recommendation XV-1 adopted at the 15th Antarctic Treaty Consultative Meeting in Oct. 1989, the elaboration of the Comprehensive Measures for the Protection of the Antarctic Environment and Dependent and Associated Ecosystems was to be undertaken by the Antarctic Treaty Consultative Parties (ATCP) at Viña del Mar in Chile in Nov. 1990. The 5 meetings, one at Viña del Mar and 4 at Madrid, were held as the 11th Antarctic Treaty Special Consultative Meeting. The meetings were attended also by non-Consultative Antarctic Treaty Parties and intergovernmental and non-governmental organizations such as CCAMLR, IOC, SCAR, IUCN, ASOC, etc., as observers. The Protocol on Environmental Protection to the Antarctic Treaty and its 4 annexes were adopted by the ATCP on Oct. 4, 1991. Part of the process of negotiations and the background of the adopted instruments are reported. The authentic texts of Protocol and its Annexes in English and their provisional Japanese translation by the author are appended. (Auth.)

M-46908

Lanker, R.G., **Competing claims among Argentina, Chile, and Great Britain in the Antarctic: economic and geopolitical undercurrents,** Monterey, Naval Postgraduate School, 1991, 120p., ADA-246 472, M.A. thesis. Refs. p.117-119.

The antarctic continent holds a vast economic potential in both renewable and non-renewable resources. Therefore, the sovereignty of the continent, and in particular the Antarctic Peninsula and Weddell Sea areas, has been a key issue between Argentina and Chile for hundreds of years. Currently these two nations, along with Great Britain, have overlapping claims in the region. This thesis examines the geopolitical and historical claims of these and other nations, along with the current and potential mechanisms that are designed to regulate the region. It also evaluates the potential for conflict in the future over the disputed region and examines current U.S. interests. It concludes that the United States should make every effort to maintain the current Antarctic Treaty System. (Auth.)

M-46951

Van Bennekom, S., **New regime to protect the antarctic environment,** *Leiden journal of international law,* Feb. 1992 5(1), p.33-52, 67 refs.

On Oct. 4, 1991 the parties to the Antarctic Treaty adopted the Protocol on Environmental Protection to the Antarctic Treaty. This Protocol contains a prohibition for fifty years on all exploration and exploitation of mineral resources in the Antarctic. The Wellington Convention, which was adopted in 1988 and was intended to regulate the exploitation of minerals, can now be considered dead and buried. Apart from the prohibition on minerals activities, the Protocol sets out a number of rules and regulations to control the activities in Antarctica in a more stringent way than before. This article analyzes the Protocol and compares the severity of the rules with the degree of control in the Wellington Convention. It seems likely that states are less willing to accept heavy bureaucratic measures if the road to minerals development is cut off. For issues like dispute settlement, environmental impact assessment, the creation of new institutions and liability, the articles in the Protocol are compared with the corresponding articles of the Minerals Convention. This article also contains some suggestions on how the current plans to protect the antarctic environment can be improved. (Auth.)

M-47172

Headland, R.K., **Delimitation and administration of British dependent territories in antarctic regions,** *Polar record,* Oct. 1992 28(167), p.315-318, 11 refs.

After reviewing the history of the United Kingdom's assertions of sovereignty over antarctic territory and their administration, this note, with accompanying maps, describes the changing delimitation and nomenclature of these territories since 1908 and their relationship with the British government in London.

M-47203

U.S. Congress. House. Committee on Interior and Insular Affairs. Subcommittee on Insular and International Affairs, **Hearing on H.R. 4515: Antarctica world park and protection act of 1990,** Washington, D.C., U.S. Government Printing Office, 1991, 306p. Serial No. 101-84.

This bill requires the Secretary of the Interior to prepare a plan for the establishment of a world park in Antarctica. To assist in judging the wisdom of such a course, testimony was taken and questions were asked of several persons knowledgeable in antarctic affairs. Will Segar, leader of the recent TransAntarctica Expedition, spoke favorably of the bill. A panel consisting of representatives of the Dept. of the Interior, Dept. of State, and the National Science Foundation, spoke against the bill, primarily because the international character of the continent does not lend itself to unilateral actions such as this. Additionally, the panel emphasized, with examples, that the Antarctic Treaty provides an experienced vehicle for the protection of the antarctic environment, aided by an antarctic environmental policy revitalized by $30 million dedicated to environmental remedial action at the U.S. bases. A second panel, with representatives from the Wildlife Program, Environmental Defense Fund and the Antarctica Project and Southern Ocean Coalition, supports H.R. 4514, particularly because it bans all mining activity in Antarctica.

M-47255

U.S. Congress. Senate. Committee on Foreign Relations, **[Hearing on the Protocol on Environmental Protection to the Antarctic Treaty (Treaty Doc. 102-22)],** Washington, D.C., U.S. Government Printing Office, 1992, 37p.

At this brief Hearing on May 4, 1992, the leader of the U.S. negotiating delegation in Madrid provided a summary of the terms of the Protocol, how it is formatted, what entities and procedures are established by the 26 ATCPs, and when it will enter into force. Twenty-three of the twenty-six ATCPs signed the Protocol on Oct. 4, 1991; from Oct. 5, 1991 until Oct. 3, 1992 it remained open for signature in Washington, D.C. Representatives from the Antarctica Project and from Greenpeace testified in favor of the Protocol and urged the Senate to give its advice and consent to the document.

M-47256

U.S. Congress. Senate. Committee on Commerce, Science, and Transportation. Subcommittee on Science, Technology, and Space, **[Hearing on monitoring the arctic and antarctic environments],** Washington, D.C., U.S. Government Printing Office, 1992, 119p.

The Hearing convened on May 13, 1991 and had as one of its major goals the comparison of the U.S. research effort in Antarctica and the Arctic. A second goal was to discover if the compromise protocol on antarctic minerals activities, negotiated in Madrid in 1991, accurately reflected the thoughts of the Congress on what those activities should be. A third goal was to gain information on the status of the ice cover with its annual and seasonal variations in both polar regions and to interpret the changes on a global basis.

M-47257

U.S. Congress. Senate. Committee on Foreign Relations, **[Hearing on Antarctica legislation: S. 2575, S.J. Res. 206, and S. Res. 186],** Washington, D.C., U.S. Government Printing Office, 1990, 114p.

The legislation cited in the title is designed to emphasize the need for increased protection for the antarctic environment and to strengthen the standards of that protection. The bill and resolutions are deemed necessary as substitutes for CRAMRA which at the time of the Hearing had lost the required ATCP consensual agreement to bring it into force. Knowledgeable individuals from the State Department, National Science Foundation,and the Senate testified as to their concerns with the form and the requirements of the proposed legislation and how it would aid or hinder other antarctic negotiations to be undertaken later with the ATCPs. There was much discussion on the difference between the research methods in geophysical studies and those of mineral explorations; it appeared that, basically, the difference lay in what the entities involved called it, and this in turn determined whether the results would be identified as proprietary data and not shared, or scientific data and shared.

M-47258
U.S. Congress. House. Committee on Merchant Marine and Fisheries. Subcommittee on Fisheries and Wildlife Conservation and the Environment. Subcommittee on Oceanography and Great Lakes. Subcommittee on the Coast Guard and Navigation, **Hearing on H.R. 3977, a bill to protect and conserve the continent of Antarctica, and for other purposes [and on] H.R. 4210, a bill to amend the Antarctic Conservation Act of 1978 to protect the environment of Antarctica, and for other purposes,** Washington, D.C., U.S. Government Printing Office, 1990, 206p.

The Hearing convened on June 26, 1990 and had as its purpose to provide for increased emphasis on the protection of the antarctic environment *vis á vis* United States activities there. It was the intent to strengthen the Antarctic Conservation Act of 1978 by amending it to broaden its scope and to correct defects resulting from increased activity in Antarctica. These flaws are specified as increases in the number of research stations, poor waste disposal, oil spills, and increased tourism; deficiencies in the CRAMRA minerals agreement; increased risks of oil spills and degrading of the environment; and over-exploiting fish stocks. A series of prohibited acts is set forth along with pertinent definitions, applicability, and penalties to be assessed for violations. Testimony was given by knowledgeable persons both in and out of government, including some of those most closely associated with Antarctica, its environment and the research programs there.

M-47259
U.S. Congress. House. Committee on Merchant Marine and Fisheries. Subcommittee on Oceanography, Great Lakes and the Outer Continental Shelf. Subcommittee on the Coast Guard and Navigation. Subcommittee on Fisheries and Wildlife Conservation and the Environment, **Hearing on H.R. 5459, a bill to implement the protocol on environmental protection to the Antarctic Treaty, and for other purposes,** Washington, D.C., U.S. Government Printing Office, 1992, 237p.

The Hearing convened on June 30, 1992, having for its principal focus a better understanding of the Protocol to the Antarctic Treaty negotiated in Madrid and adopted on Oct. 4, 1991, and to compare it with the draft of implementing legislation. To that end, oral and written statements were taken from 17 witnesses. Sets of written questions from the Committees and responses from the witnesses were admitted to the record along with a section-by-section analysis of H.R 5459. Additionally, the 17 witnesses, who represented a broad spectrum of government and private interests, and who are deeply involved in antarctic activities, were questioned at some length to ascertain their opinions as to the efficacy of the Protocol and to get some idea of the thinking of antarctic-knowledgeable persons as to what direction the enabling legislation should take.

M-47295
U.S. Congress. House. Committee on Foreign Affairs. Subcommittee on Human Rights and International Organizations, **Hearing and markup on Title II of H.R. 2984, H. Con. Res. 287 and H. Con. Res. 227,** Washington, D.C., Government Printing Office, 1990, 217p.

The Hearing convened in two sessions, May 2 and July 19, 1990. At the first gathering, representatives from these groups testified: the Cousteau Foundation; Environmental Policy Institute, Friends of the Earth, and Oceanic Society; World Resources Institute; and Greenpeace. The primary focus of the Hearing was on the antarctic Minerals Convention and its relationship to the protection of the antarctic environment. Three of the witnesses spoke with varying degrees of intensity against the Convention. The witness from the World Resources Institute pointed out several positive aspects of the Convention. At the July 19 meeting, representatives of the Administration testified, speaking in favor of the Minerals Convention (CRAMRA, Wellington Convention), emphasizing the stringent conditions that would apply to any mineral seeker and the consensus needed from the ATCPs before any exploration or extraction could occur.

M-47296
U.S. Congress. House. Committee on Science, Space, and Technology. Subcommittee on Science, Research and Technology, **Hearing [on Antarctic minerals policy, July 12, 1990],** Washington, D.C., U.S. Government Printing Office, 1990, 171p.

The focus of the Hearing was on the Convention on Regulation of Antarctic Mineral Resource Activities (CRAMRA) and the controversy which developed after it was sent to the CP nations for acceptance. Following brief opening statements by members of the Committee or Subcommittees, testimony was taken from representatives from the Office of Technology Assessment, Congressional Research Service (Library of Congress), Department of State, National Science Foundation, Sierra Club International, the Antarctica Project, University of Texas (a Senior Research Scientist), and the University of Wisconsin (a Professor of Geophysics). All witnesses agreed that the antarctic environment must be especially protected because of the global influence Antarctica wields over the habitability of the planet. The instruments and methods needed to ensure that protection produced the conflicting viewpoints. Those favoring a complete ban on all mineral activity interpret CRAMRA as opening the door to minerals development and mining activity. Those who support CRAMRA believe it opens the door only under very special conditions and stringent pre-conditions requiring consensus among all ATCPs. They also believe that banning all mineral activity would preclude research in geophysics because the methods used by minerals explorers are the same methods used by geophysics researchers and that tool would thereby be denied them.

See also:
A-45088 A-46460 B-45938 B-47138 B-47202 I-46060

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Cold effects
See: Low temperature effects

Communication
See: HF communication; Radio communication

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Used as subordinate term under various types of ice (snow)

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- *See [also]:* Geomagnetic field/Conjugacy

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- BUILDINGS
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- RUNWAY
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Continental ice
See: Glacier ice; Ice sheet

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Lithology

See: Petrology

Liverworts

See: Bryophyta-Hepaticae

Locomotion

Used as subordinate term under various types of animals (plants)

Logistics

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Luminescence

Used as subordinate term under various types of ice (snow)

Magnetic activity

See: Geomagnetic disturbances/Activity indices

Magnetic anomalies

See: Geomagnetic field/Anomalies

Magnetic bays

See: Geomagnetic disturbances/Bays and pulsations

Magnetic exploration

Used as subordinate term under various types of ice (snow)

Magnetic field (in space)

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Magnetic poles

See under: Geomagnetic field. *See also:* Polar wandering

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See: Geomagnetic disturbances/Storms

Magnetism

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Magnetohydrodynamic waves

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Mail
See: Postal service

Maintenance
Used as subordinate term

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GEOGRAPHIC DISTRIBUTION
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Sightings of *Eubalaena australis* in Chilean waters, 1983-1989 [1992, spa] **B-46936**
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Parasite fauna as potential stock indicators of antarctic whales [1991, eng] **B-45757**
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EXPLOITATION
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Used as subordinate term under various types of ice (snow)

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- *Used as subordinate term under Aurora and various types of animals (plants)and ice (snow)*

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See under: Aurora

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[Also] used as subordinate term under various types of animals (plants)

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[Also] used as subordinate term under various types of ice (snow)

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See [also]: Tectonics

Structure
See under: Atmosphere. *Also used as subordinate term under various types of ice (snow)*

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Sublimation
Used as subordinate term under various types of ice (snow)

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Sudden warming
See under: Stratosphere

Sunspots
See under: Solar activity

Supply
See: Food supply; Logistics; Transportation

Surface features
Used as subordinate term under various types of ice (snow)

Surveys
See under: Geomagnetic field. *See also:* Geodetic survey; Seismic exploration; Topographic survey

Survival
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See [also]: First aid; Search and rescue

Suspended sediments
See: Sea water/Suspensions

Symposia
See: Conferences

Taxonomy
Used as subordinate term under various types of animals (plants)

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